the OIL AND GAS JOURNAL

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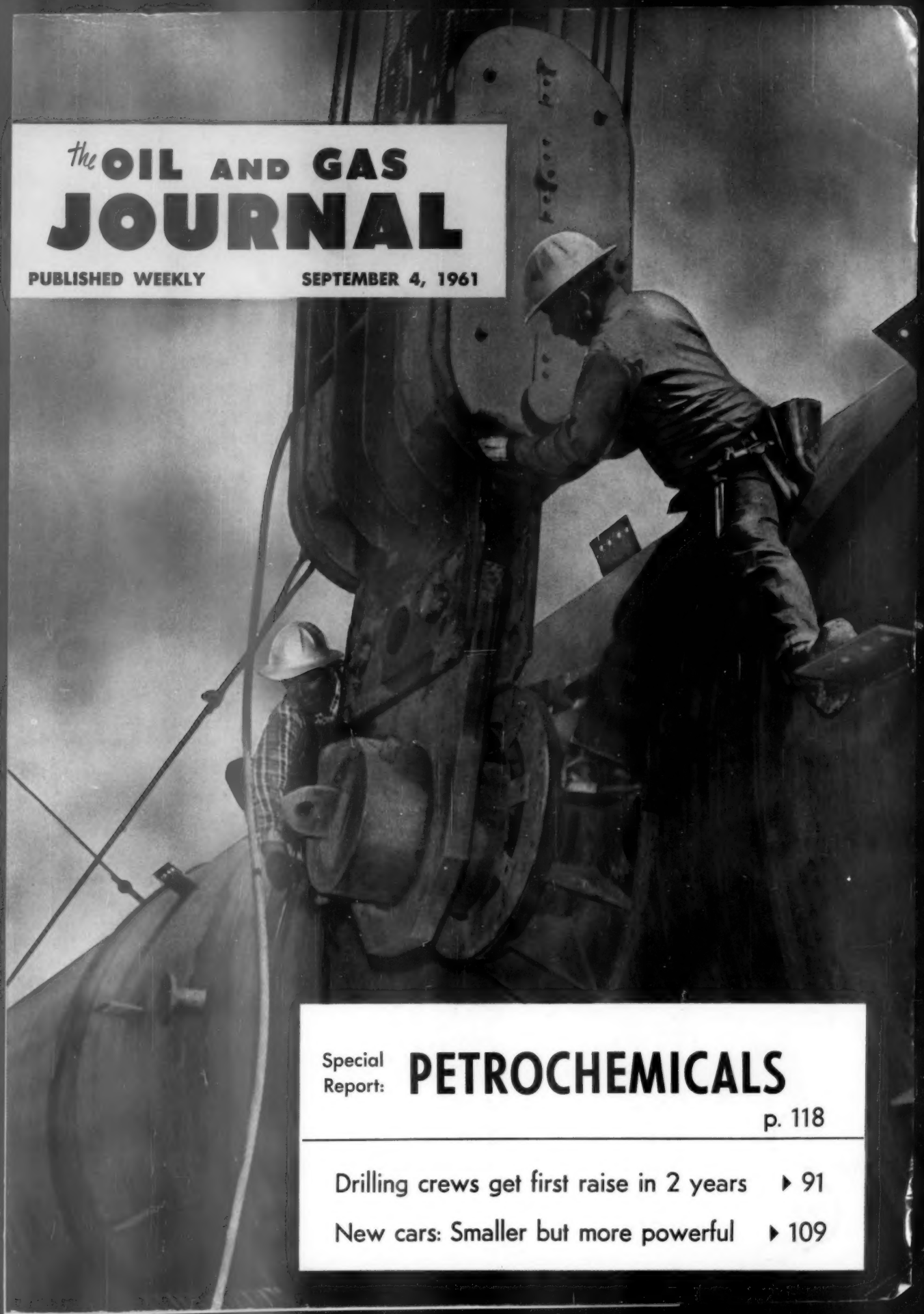

Special Report: **PETROCHEMICALS** p. 118

Drilling crews get first raise in 2 years ▸ 91

New cars: Smaller but more powerful ▸ 109

This Cabot 456D-256-120 pumping unit is designed to run for years with little attention. That makes it vital for bearings on the gear reducer's slow speed shaft to take heavy loads, position shafts—be practically maintenance-free. That's why Cabot Corporation, Machinery Division, specified Timken® tapered roller bearings. "In fact", reports Cabot, "our pumping unit gear reducers were Timken bearing-equipped on the first design—have been through the years because of trouble-free operation." Their tapered design lets Timken bearings take radial and thrust loads in *any* combination. No clamping devices are needed for inner or outer bearing races. Tight fits are used for both races, and exact running clearances are set after assembly. This permits accurate location of the shaft and gear, resulting in better performance, lower maintenance.

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OIL AND GAS JOURNAL
Vol. 59, No. 36

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ANNUAL PETROCHEMICALS REPORT

Petrochemical Building Continuing at High Level 118

By Hugh S. Pylant

This review of the Journal's annual survey of plants and construction projects shows that last year's building pace is being maintained. Also included is an outlook for synthetic rubber and a view of the swift growth of aromatics.

1961 Survey of Petrochemical Plants in the U. S. 122

By Robert B. Bizal

The Journal's ninth annual petrochemical survey lists more than 400 plants in the U. S. alone, plus about 90 new construction projects or expansion programs under way or planned. This timely and exclusive report gives company-headquarter addresses, plant locations, raw materials, and products at each plant.

New Survey of Petrochemical Plants Outside the U. S. 139

By Robert B. Bizal

More than 300 existing plants and 200 construction projects in the free world outside the U. S. are shown in this up-to-date survey. Forty countries are listed. The report, which includes raw materials, products, capacities, and addresses, is alphabetized by countries and companies.

What's Ahead for Petroleum Aromatics? 171

By George Adams and B. G. Casteel

Former specialty operation has grown to $350-million-a-year giant in just 10 years. Of the nation's 300 refineries, 47 are now producing aromatics from 35 million barrels of feed stock per year.

Synthetic Rubber—Big and Still Growing 176

Continued growth and expansion is expected in the years ahead as exciting new synthetic rubbers are continually appearing on the scene.

Cover Photo: Petrochemical growth is typified at Cities Service Refining Corp.'s project at Lake Charles, La. Here workmen attach cables to lugs of a 220-ft. tower for lifting into position as part of a new orthoxylene plant. (Photo courtesy "Service," a publication of Cities Service.)

TECHNOLOGY—OPERATION

New Tool Puts Finger on Faulty Crude-Tower Distillation 179

By G. C. Thrift

Superimposing distillation curves from a problem unit over ideal ASTM curves is valuable aid in trouble shooting tower problems.

Arkoma Basin—Full of gas and Headaches for Drillers 182

By W. B. Bleakley

"One of the toughest drilling areas in the country," is what they're saying in the Arkoma basin, around Red Oak, Okla. And no one knows it better than Midwest Oil Corp.'s engineers.

Refinery Cost Indexes 190

On the Job: Pipelining:

Photo-Alignment Maps Most Used by Great Lakes 191

Scaled 1,000 ft./1 in. maps have aerial picture of routes with pertinent data on surface features, land ownership, pipe data in parallel.

Transistor Radios Used for Better Communication 192

Columbia Gulf Transmission Co. has replaced its vacuum-tube units to get more efficiency and reliability.

Oil's Smithsonian Showcase 241

A special subcommittee of the API's Division of Production has been formed to gather material of historical and educational value.

THE OIL AND GAS JOURNAL **Newsletter**

September 4, 1961

Significant this week

For the first time in more than 2 years, drilling crews are getting a wage boost.

This fall, most contractors in Gulf Coast, Southwest, and Mid-Continent regions will grant raises. Final pattern is expected to be 5% wage increase and a 6-day work week.

There's plenty of reason for the move. Key crewmen have been streaming into other kinds of work that offer better pay and shorter hours. Contractors say the situation is serious, and may get worse.

Footage rates will have to be jacked up to support the wage boosts, contractors say. They claim it can't be done on currently depressed footage prices and narrow profits (p. 91).

Drillers have little to show for the millions they've spent in federal waters off Texas, but they won't give up.

Since 1954, the industry has shelled out $100 million in lease payments and operational costs—and there isn't a single producing well to show for it.

Eight wildcats found oil or gas. But four of these have been abandoned and four are shut-in as noncommercial.

Oil companies are still willing to gamble, however. They remember successes in other areas that had been plagued by dry holes (p. 96).

Future growth of petrochemicals may not be as spectacular as in the past, but steady gains are in the cards.

That's how the Journal sums up the outlook for the industry in the Annual Petrochemical Report in this issue.

Exclusive survey gives up-to-date facts on more than 700 operating plants and some 300 construction and expansion programs throughout the free world. Also covered: Trends in petrochemicals, prospects for synthetic rubber, a look at the fast growth of aromatics (p. 118).

Detroit's putting stress on performance as well as economy in 1962 cars.

Typical model will be more powerful, though smaller.

Composite picture shows compression ratios, horsepower, and displacement will be up—and there'll be a slight increase in octane requirements.

Trend toward service-free car will be visible in new models, too. Average '62 auto will need fewer oil changes, less greasing (p. 109).

New director of Interior's Office of Oil and Gas will be Jerome J. (Jerry) O'Brien.

His appointment will be announced this week by Interior Secretary Stewart L. Udall.

The 54-year-old O'Brien, a California-Texas oil man, is a former president of TIPRO. He has served on a number of IPAA committees. At present he's an area superintendent for Humble Oil, and lives in Midland (p. 100).

Fuels-policy study by Senate committee is drawing closer.

Proposal for study has cleared first hurdles, and vote of approval is expected when it reaches Senate floor. New Mexico's Democratic Sen. Clinton P. Anderson will chairman study group.

On other side of the Capitol, preliminary work is going ahead on broad fuels study being undertaken by House Small Business Subcommittee. This unit, headed by Oklahoma Democrat Tom Steed, hopes to start hearings soon (p. 108).

Refinery runs have vaulted to an all-time high.

For week that ended August 25, runs averaged 8,558,000 bbl. daily.

Previous high was registered during week that ended March 3, when the average was 8,474,000 bbl. a day.

Interesting sidelight: In contributing to new all-time record for country as a whole, none of the major refining districts chalked up a record of its own (p. 103).

Books show that FPC okayed record amount of natural-gas-transmission projects in 1961 fiscal year.

Included: About 6,000 miles of pipeline and addition of 330,000 hp. in compressor capacity. Value is figured at more than $850 million.

To show how rapid growth has been in postwar years: In 1945, dollar value of projects approved was $34 million. Six years ago, total was $465 million (p. 95).

On the foreign scene:

Private oil companies in Indonesia have been ordered to fork over 60% of their profits to the government.

This is their penalty for failing to go along with mercurial President Sukarno on terms for new oil agreements.

Sukarno had hoped new pacts would be signed in time for him to make some political hay on country's independence-proclamation anniversary last month, but the companies didn't fall in line. So he lowered the boom.

However, those in the know expect negotiations will be reopened soon (p. 115).

Oil demand is booming in Italy, but competition is also getting keener.

Powerful newcomers are helping to squeeze major-owned profits. And situation is complicated by state-owned ENI,

whose boss—Enrico Mattei—has declared he wants to knock the props from under big oil firms (p. 112).

Latest available figures show over-all gain in foreign crude output.

Free-world production climbed about 85,000 bbl. daily in June. Middle East had slight dip, but this was offset by increases in North Africa, Far East, and Latin America (p. 114).

News in the making

There'll be no shortage of oil-country goods, despite a pickup in business, low inventories, and increased defense spending.

Supply men say all industrial needs and military demands can be met—with a lot of capacity left over. Only possibility of a shortage, they say, lies in "fear" buying. If Berlin gets hotter, if worried companies begin buying far more than they need, and if others "follow the herd"—then supplies could get tight.

Otherwise, oil-country goods will be more than abundant.

Chances are good that Ohio will enact some new laws on oil operations.

There's increasing interest in deep formations. Recent meeting of governor's staff was told that 21 major companies are exploring state with an eye to ultra-deep-drilling.

Ohio authorities have held several discussions on new approaches to brine-pollution problem because of upsurge in interest. Also discussed: More effective rules on spacing, regulation, and production.

Petrochemicals could turn out to be important factor in crude-run levels.

They may be playing a part now—a minor one—in high runs to stills. At some refineries, minimum level of runs is fixed by chemical feedstock requirements—tail's wagging the dog.

So far, this isn't having serious impact. But it might in future, as refiners become increasingly involved in petrochemicals.

Expect Canadian crude-oil exports to U. S. to average 200,000 bbl. daily over next 3 months.

Estimates filed with Saskatchewan and Alberta Conservation Boards see exports of 206,000 bbl. daily in September, 188,000 bbl. daily in October, and 210,000 bbl. daily in November. About 55% will go to Puget Sound area of Washington, remainder to Great Lakes and to North Central states.

Look for jump in U. S. naphthalene output this year.

Total should reach 520 million pounds, or 18 million more than in 1960.

Market memo

Sept. 4, 1961

The big motoring season is ending on a sour note.

Prices are still dropping. **High stocks** linger. Now most of this gasoline must be carried over the long winter. **Refinery runs** stay too high; and unless a really drastic cut is made soon, stocks of heating oils will start getting out of hand.

Poor prices for distillates following a lousy gasoline season will sock profits harder.

Third-quarter profits of integrated companies undoubtedly will be lower than last year.

A price study by one company shows why: **Bulk prices** on the Gulf are one-fourth cent below those of last year in August, and Oklahoma Group 3 prices are off 1.75 cent a gallon. Nationwide **tankcar prices** are off 0.6 cent, **tankwagon prices** in 55 key cities off 1.52 cent, and **retail prices** off 0.4 cent.

Marketers should note the **increasing attention being given in Washington** circles to marketing studies and proposed legislation.

A **flurry of bills** has been aimed at below-cost sales and other aspects of marketing. And Rep. James Roosevelt hopes to set the stage for a loan program to enable operators to buy their own service stations. Last week there was a hearing on a bill to ban functional discounts. Advocates thus far have been a little discouraged by lukewarm backing from Justice Department and Federal Trade Commission on most of these moves. They had hoped for more support.

Outlook: None of the legislation is likely to be enacted this year, but the pot will be kept boiling for 1962. Meanwhile, OCDM, Justice, and FTC will keep marketers jumpy by probes into pricing and marketing of residual fuel and home heating oil.

New crude postings: Sohio has cut 8 cents per barrel off its postings in Mississippi fields of Carey, Flora, Oakley, and Tinsley. New top is $2.95 on about 7,500 bbl. daily . . . **Gulf** has dropped posting for East Texas in its new bulletin and added postings for Barb-Mag on the Gulf Coast and Keystone (Silurian) in West Texas.

The gasoline price picture:

Oklahoma Group 3 spots are off one-fourth cent on the low side making price range of 10.50 to 11 cents a gallon.

Weakening signs also are developing **on the Gulf Coast** where realistic prices are 10.50 cents for 90-octane, 10.75 for 92-octane, and 11.75 for 98-octane. Four cargoes are reported available now with two or three more coming on the market for late September lifting.

Mississippi River markets report little buying interest with spots likely holding at one-fourth to one-half cent off gulf lows.

In the eastern sector, subnormal prices persist in price-war areas of Indianapolis, Buffalo, Newport News-Norfolk, and Charlotte. New price weakness also crops up in eastern Pennsylvania and Michigan. Sun has extended nine-grade pumps into Buffalo and may move next into Cincinnati. Gulf reportedly is planning to introduce Gulftane to Fort Wayne, Ind.

Good Wells Make Good News

Recent Frac Treatments That Solved Special Production Problems

September 4, 1961

Knotty production problems can often be solved by Dowell fracturing treatments. Dowell has many modern tools to help both in planning and in performing frac jobs, whether routine or complex. Some of these advancements include the Frac Guide*, computer calculations and fracture conductivity tests. Here are four recent examples of Dowell frac jobs that solved special production problems:

- **Ashtabula County, Ohio** (New Oil Well) Pay zone was the low permeability, low porosity Medina sand. Perforations were from 3760 to 3765 feet. Other wells in the area, given small frac jobs, have been poor producers with rapid decline rates. Dowell engineered a treatment with the aid of the Frac Guide. 37,000 gallons water with FLA* fluid loss additive carried 66,000 pounds sand. Injection rate was 50 bpm. *Before treatment, well made show. After treatment, production was scheduled at 160 bopd through a 1/16th-inch choke.*

- **Andrews County, West Texas** (New Oil Well) This well had been abandoned after previous treatment efforts had failed to result in commercial production. Several cement squeeze jobs had been performed. Perforations into the Devonian were from 12,040 to 12,045 and from 12,063 to 12,073 feet. Dowell used Acid Petrofrac* fracturing service. 50,000 gallons acid-oil emulsion and 13,000 pounds sand were injected down tubing at pressures up to 7500 psi. *After treatment, well tested 463 bopd flowing through a 24/64th-inch choke.*

- **Muhlenberg County, Kentucky** (New Oil Well) Dowell used Abrasijet* abrasive jetting service to perforate into the Paint Creek sand between 1909 and 1920 feet. Well was then treated down casing. A spearhead of 1000 gallons kerosene with Freflo* surface active agent was followed by frac job. 17,000 gallons lease crude, 20,000 pounds sand and 800 pounds of a fluid loss control agent were used. *45 days after treatment, well was still making 160 bopd. An offset shot with nitro made 80 bopd.*

- **Hutchison County, Texas Panhandle** (Old Oil Well) This is one of the many shallow wells completed into the Dolomite of the Panhandle field. The problem was to fracture several zones in stages. The pay has very low structural strength. Later stages of a frac job are likely to break past the cement bond into the zone fractured first. Dowell engineers designed a treatment that employed a gel diverting agent followed by permeable ball sealers. *Operator reported that the production increase was 30 percent above increases obtained from previous treatments on other wells in the area.*

Let a Dowell engineer help you select a treatment designed to solve your production problem profitably. Dowell services and products are offered in North and South America, Europe, North Africa and Iran. Dowell, Tulsa 14, Oklahoma.

*Dowell Trademark

SERVICES FOR THE OIL & GAS INDUSTRY — DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DYNAMIC ADSORPTION . . . that's the name applied to the short-cycle hydrocarbon adsorption process developed by Parkersburg. Beads of desiccant, thousands of pounds per tower, act as "sponges" in adsorbing hydrocarbons from the flowing gas stream.

But desiccant beads soon become saturated with liquid hydrocarbons, and must be reactivated (their captive liquid removed) in order to adsorb more hydrocarbons. Even the largest beds of desiccant become hydrocarbon-saturated in a matter of *minutes* . . . and Parkersburg keeps its beads *active* through complete regeneration as often as every fifteen minutes.

That's what Parkersburg means by *Dynamic Adsorption* . . . keeping the dessicant *active* through frequent cycles: adsorption, regeneration by controlled heat, then cooling prior to further adsorption. The benefit to you is the *extra* hydrocarbon product adsorbed, removed and condensed by Dynamic Adsorption. As an extra bonus, gas is dehydrated to pipeline specifications.

There are many more Parkersburg DAU's (Dynamic Adsorption Units) in service than all competitive adsorption units combined. Let your Parkersburg man show you why.

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in for life: Once you weld a Rockwell Hypresphere valve into your pipeline, it's in for life —you'll never need to see the inside again. The seats in these spherical, full-opening valves are renewable forever, without taking the valve apart. And you know that today, tomorrow or any time in the lifetime of the line you need quick, sure shut-off, you'll get it with Hyprespheres. We'll be happy to send you complete information.

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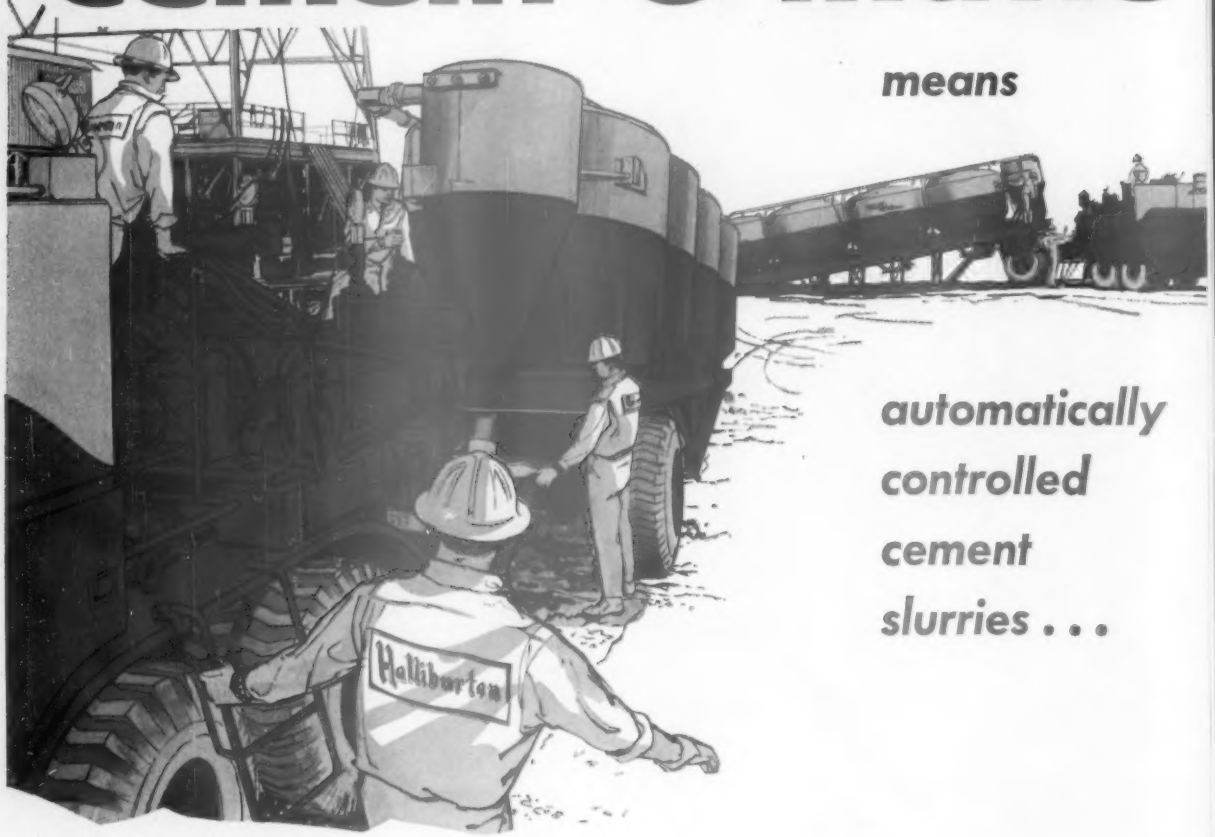
Cement-O-matic



means

automatically controlled cement slurries . . .

a new Halliburton development!

"CEMENT-O-MATIC" is Halliburton's new automated slurry mixing system for primary and remedial cementing. It is designed to:

- AUTOMATICALLY MAINTAIN a constant preselected slurry weight.
- CONTINUOUSLY MEASURE the weight of cement slurry and indicate the flow rate.
- INSTANTLY INDICATE the total flow at any point during the cementing job.

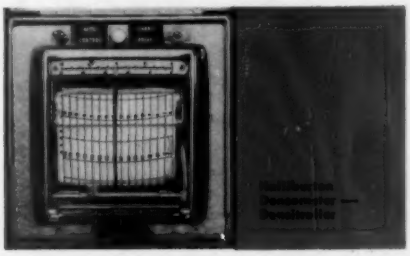
The new automatic instruments which make "Cement-O-matic" possible are the Densometer, Densitroller, Flow Meter, and Flow Analyzer — all developments of Halliburton research. The "Cement-O-matic" slurry mixing system represents another Halliburton achievement in the search for *better* cementing services and techniques . . . a more uniform cement slurry can now be placed which helps eliminate weak "troublesome" spots in the cement column . . . the position of cementing plugs can be more easily determined during a cementing operation and the cement location can be more accurately checked during plug back or squeeze operations.

Revolutionary improvements such as the Cement Jet Mixer, developed by Halliburton nearly 40 years ago — Bulk Cementing, special cements, cement additives and Pneumatic Bulk Cement Handling Equipment, pioneered by Halliburton — and now "Cement-O-matic" . . . these are but a few examples of how Halliburton applied research works for you to increase the efficiency of your service dollar.

1 monitors the slurry density

A slurry sample is continuously passed through and measured by the DENSOMETER. Within ten seconds after *any* change in density is noted by this sensitive instrument, pneumatic pulses reflecting the change are signalled to the Densitroller, which then acts to return the slurry to the pre-selected weight. The Densometer/Densitroller team can maintain a density accurate to within ± 0.1 pound per gallon throughout its entire 6 to 21 pounds per gallon range.

2 automatically controls slurry density



The new Halliburton DENSITROLLER is the controlling instrument which maintains the cement slurry weight desired. This weight is pre-set on the Densitroller by the operator. The instrument then controls the system to maintain this pre-selected weight automatically, regardless of changes in flow rate and/or pressure. With the Densometer and Densitroller both in use, the pre-set density can be changed by the operator at any desired point during the job by resetting the density selector. The slurry weight is continuously recorded on a strip chart.

3 measures slurry flow rate

The Halliburton Turbine FLOW METER and FLOW ANALYZER makes possible the determination of the cementing plug's position at any time during the cementing job. Also, in plug back or squeeze operations, the cement position can be more quickly and easily calculated at any time. These calculations are based on the continuous gpm flow rate and cumulative total flow readings displayed by the Flow Analyzer. This data is obtained by the Turbine Flow Meter which is installed directly in the slurry flow line, and continuously transmits the data to the Flow Analyzer.

Ask your Halliburton man about the availability of "Cement-O-matic," the new automated cement slurry mixing system.

CEMENTING SERVICES

275 Service Centers ... just minutes away from your well!

Halliburton
COMPANY • DUNCAN, OKLAHOMA

Contactor No. 7

Gas treating tips from Allied Chemical

How to Find and Correct Trouble Spots in Your Gas Treating Unit

Locations in an ethanolamine gas treating plant most likely to cause operating difficulties from time to time, are pumps, amine stripper, heat exchangers and contactor. Often these spots are the source of trouble during plant start-up; paying particular attention to them then can save you lots of time later. But whether yours is a new unit or one in operation for some time, the following trouble-shooting hints can help you solve operating problems faster.

Prevent Cavitation of Solution Pumps

Two causes of cavitation in pumps are high quantities of carbon dioxide in the lean amine stream they normally handle, and suspended solids. To correct the former, CO_2 loading and solution pressure must be controlled.

Large amounts of suspended solids can rapidly erode pumps and usually are the result of faulty filter operation. You can minimize damage by slowing pumps down slightly from design speed, but this is only a stop-gap measure.

Proper Operation of Stripper

If the CO_2 content of the lean amine solution exceeds 5 volumes per volume of amine solution, it will damage the reboiler tubes. So careful testing of this solution is necessary—especially early in the life of a unit.

The overhead condensate of the amine regeneration still should contain a slight amount of MEA or DEA—generally 0.5% of whichever amine is used—as a corrosion preventive. Otherwise CO_2 or H_2S or both, which are normally present with water in the overhead, will chew up the equipment. But don't have too much amine in the overhead condensate, or your reflux rate won't be high enough and you will suffer high amine losses.

Keep Data on Heat Exchangers

You should record data on the performance of various heat exchangers in the plant as soon as possible after start-up. This is invaluable in determining fouling rates and other performance factors as operations progress. Such information should be referred to if corrosion of any heat exchanger is suspected or if the plant is not processing the required amount of gas.

What To Watch in the Contactor

Keep the temperature of the lean amine to the contactor about 10° higher than the inlet gas temperature. If you don't, you may condense hydrocarbons in the rich amine solution—and bad foaming will result. Where the inlet gas temperature is exceptionally high, keeping the amine solution 10° hotter may interfere with proper gas absorption. In that case, you may have to cool the inlet gas stream before charging it.

Maintain a close check on the control valve on the rich amine stream leaving the contactor—even using the manual by-pass and inspecting the inner valve assemblies. This valve gets hard service because pressure drops markedly at this point, and evolution of corrosive CO_2 and H_2S can occur. You may consider using a rich amine flashtank with interchange at an intermediate pressure to make conditions less severe for the valve.

FOR MORE INFORMATION on gas treatment, look for the next GAS TREATING TIPS.

For specs on Allied Chemical Ethanolamines and Ethylene Glycol, and offices, see Chem. Materials Catalog, page 272 and Chem. Week Buyers' Guide, page 272A. 2819

Allied Chemical

NITROGEN DIVISION
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NEW ROCK ISLAND GLASS/REINFORCED EPOXY PIPE

~ A significant development in corrosion control which develops maximum strength because it is

PRE-STRESSED

JUST as with pre-stressed concrete, *pre-stressing* alternate longitudinal and lateral plies of glass roving in Rock Island's new glass/reinforced-epoxy pipe develops maximum, collapse and tensile strength — by placing the load on the *glass* rather than the epoxy resin.

And — as a result of three years of intensive laboratory and field testing — Rock Island has thousands of feet of this significant, new tubing and pipe line (in 2-, 2½-, 3-, and 4-inch I. D. in 20-ft. lengths) performing to high satisfaction in many mid-continent oil fields.

Additionally, Rock Island reinforced-epoxy tubing has been found extremely effective under conditions which require critical corrosion control under high-pulsating pressures. These include: oil production lead lines and tank battery hook-ups; salt water disposal water lines and disposal well tubing; water flood system line pipe and well tubing; as well as chemical industry uses which include corrosive fluid lines and waste water disposal.

For oil field use, Rock Island's new glass/reinforced-epoxy pipe has been designed for rugged, practical application. Upset ends are fabricated into the tubing, during manufacture, for maximum strength. Tubing can be handled in doubles . . . and regular chain tongs may be used in making up joints. Tubing strings can be suspended on slips. Threaded and coupled joints are used, with standard AST 60° stub threads. Adaptors are available for 8 round E. U. E. and normal pipe thread. Dresser-type couplings may be used.

At this writing, Rock Island's new tubing and line pipe are available in 2″, 2½″, 3″, and 4″ sizes. On special order, 6″, 8″, and 10″ line pipe can be fabricated to user's specifications. Future production scheduling includes larger sizes up to 30 inches in diameter. Detailed information and specifications are available. Contact us—today.

ROCK ISLAND

ROCK ISLAND OIL & REFINING CO., INC.
321 West Douglas Avenue. Wichita Kansas, Phone: WHitehall 3-8981

"Every dollar in our production budget is doing a man-size job . . . take these Unibolt Valves, for instance"

The UNIBOLT WING VALVE was designed originally as an "adjustable choke" for Christmas tree service. It is performing that job with distinction everywhere.

However, production men have found so many other uses for this wing valve that it is losing its original identity and is now regarded as an excellent multi-purpose valve!

Gas meter runs are one good example of this valve's versatility. It is equally popular on oil gathering manifolds, waterflood injection manifolds, heater-treaters, and a wide range of special valve applications. The one-inch opening in the UNIBOLT Valve will usually pass a far greater volume of gas than can be produced. Unlike conventional single purpose gate and plug valves, the UNIBOLT Valve offers a number of advantages: Conversion to positive choke or Pressurematic Valve, completely salvageable, easily renewable parts, and selective trims.

Make every dollar in your production equipment budget do a man-size job, too! UNIBOLT Valves, Fittings, and Couplings are made for you with that in mind.

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JUST LIKE MONEY IN THE BANK

Save as you store volatile liquids in General American conservation structures

General American fabricates tanks with every type of floating roof, tanks with lifter roofs, dry-seal gasholders and vapor balancers that will pay for themselves with the product they save.

Two outstanding seals—the Wiggins Safety Seal, safest, surest seal you can buy, and EverSeal, a solid cushion seal especially made for "problem" liquids — are offered with the floating roofs.

Skilled field crews of General American and subsidiaries are available to erect these structures where you require them.

Write for General American Bulletin No. PW-1059 for descriptive details.

General American Floating Roofs
Hidek
Lodek
Double Deck
Annular Pontoon
Pan

General American Floating Roof Seals
Wiggins Safety Seal
EverSeal

Other conservation structures
Lifter Roof Tanks
Dry Seal Gasholder
Vapor Balancer
Atmospheric Pressure-Refrigerated Storage Tank

Plate and Welding Division
GENERAL AMERICAN TRANSPORATION CORPORATION
135 South LaSalle Street
Chicago 3, Illinois
Offices in principal cities

PIPE LINE SERVICE CORPORATION

X-TRU-COAT

PAT. NOS. 2,447,420 — 2,467,642
PRODUCED UNDER THE DEKORON PROCESS

WE'VE COATED 6,000,000 FEET OF PIPE WITH X-TRU-COAT

Our experience and know-how are at your service!

When you require X-TRU-COAT pipe, call on us for immediate, unlimited production in sizes ½" through 4½" O.D. We're applying X-TRU-COAT at our Sparrows Point, Maryland, and Youngstown, Ohio plants, and shortly will be in production at our Franklin Park, Illinois plant.

Of independent producers, only PLS offers you the experience of X-TRU-COAT application since December, 1960. PLS handles pipe from any source, and schedules it to meet your delivery requirements. Specify Pipe Line Service on all of your X-TRU-COAT orders.

For prices and complete information about this service, call or write Pipe Line Service Corporation, Franklin Park, Illinois, or the nearest Sales Office:

Atlanta, Ga.; Harvey, La.; Sparrows Point, Md.; Omaha, Nebr.; Monmouth Junction, N.J.; Syracuse, N.Y.; North Lima, Youngstown, Ohio; Glenwillard, Penn.; and Corpus Christi, Dallas, Houston, and Longview, Texas.

Pipe Line Service Corporation

A SUBSIDIARY OF AMERICAN STEEL FOUNDRIES

General Offices and Plant: Franklin Park, Ill.

Thousands of miles of pipe coating protection since 1931

NEW CHIKSAN SPRING BALANCED LOADING ARM—

Here is a series of loading arms that is built to deliver solid performance right around the calendar. Outstanding new compression spring design offers finger-weight flexibility, yet the arm will not creep or sag when released. Springs are housed in a sturdy weatherproof steel case. Balance adjustments are accomplished with a hand wrench. The swivel joints on the arm have the dependability that has been associated with the name Chiksan for 30 years. Get the facts. Write for Bulletin 1-61.

4 MODELS FOR PETROLEUM SERVICE

Select from a complete line. All models —Folded Arm, Sliding Sleeve (shown above), Bottom Loader and Long Reach are available in 2, 3, and 4-inch sizes. Each model is a complete, ready for service, unit.

2 MODELS FOR CHEMICAL SERVICE

For loading or unloading virtually any chemicals, Chiksan offers a standard group of arms equipped with its DS series swivel joints. Available in Folded Arm model or Sliding Sleeve unit (shown at left).

FEATURING NEW TOTALLY ENCLOSED COMPRESSION SPRING—

Self compensating spring tension provides complete balance at any position. Compact design. No protruding brackets or counterweights.

WANT TO CONVERT EXISTING EQUIPMENT?

Chiksan Base Arm Sections permit operators to change existing facilities with minimum effort. Base Arm Sections are available in standard sizes of 2", 3", and 4". Riser joint supplied with threaded or flanged connections.

MAIL COUPON TODAY **FOR COMPLETE INFORMATION**

CHIKSAN COMPANY
330 North Brea Blvd., Brea, Calif.

Please send me your Bulletin 1-61.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

#61-60

CHIKSAN fmc

CHIKSAN COMPANY—General Offices: Brea, California • Well Equipment Mfg. Corp. Division (Weco Unions, Hamer Valves) • Chiksan International • Chiksan of Canada Ltd.
Offices and Representatives in Principal Cities of the World

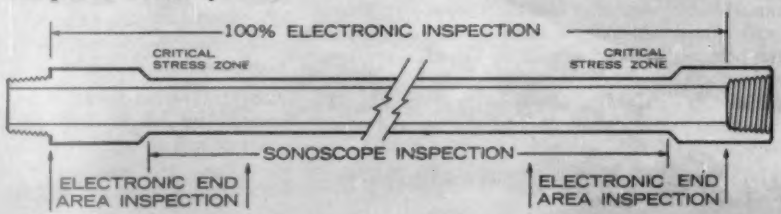
Tuboscope
COMPANY
J. ZIEGLER
TUBOS

First major advancement
in drill pipe inspection since 1957

NEW INVENTION STOPS END AREA FAILURE

NOW! Drill pipe end areas electronically inspected with new electronic end area inspection instrument

Exclusively, and for the first time in the drilling industry, Tuboscope offers electronically accurate inspection of drill pipe end areas. With electronic end area inspection and SONOSCOPE® inspection of the pipe body, your drill pipe may be inspected from end to end with unequaled accuracy.



You can select reusable drill pipe with confidence never before possible.

Many Drill Pipe Failures Occur in the End Area

Increasing demands for faster drilling mean more stress in drill pipe end areas. Now Tuboscope offers a superior method of inspecting this danger zone.

Potential Failures Eliminated From Your String

Now you can select, in complete confidence, good drill pipe for re-use and discard that which is dangerous to continue in service. Tuboscope electronic end area inspection, when used in conjunction with superior SONOSCOPE® with MINIMAX,* gives you the world's most reliable drill pipe analysis. For a demonstration of this new concept in drill pipe inspection, contact your nearest Tuboscope representative.

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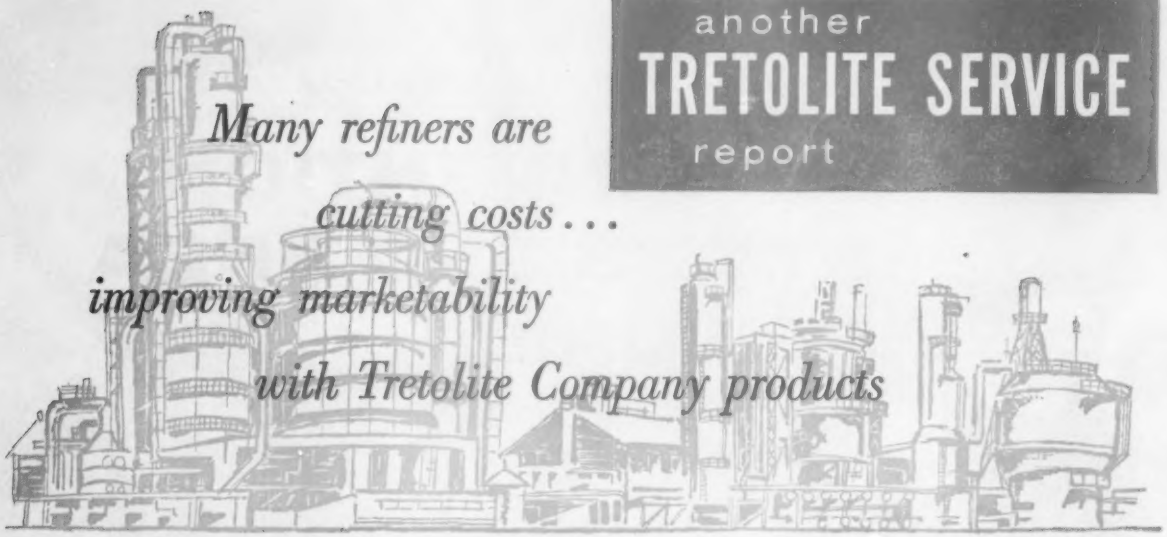
another
TRETOLITE SERVICE
report



Many refiners are cutting costs . . . improving marketability with Tretolite Company products

TRET-O-LITE*Demulsifiers

TRET-O-LITE demulsifying chemicals were developed and pioneered to enable producers to reclaim profitably otherwise unmarketable emulsified crudes. Refiners also use TRET-O-LITE emulsion-breakers to salvage usable oil trapped in "tank-bottoms", thereby gaining valuable storage capacity lost when tank-bottoms accumulate. TRET-O-LITE demulsifying chemicals are effectively used to reclaim usable oils from refinery waste disposal systems and separator traps.

If oil and water emulsification is causing an operating problem in your refinery, call Tretolite.

TRET-O-LITE*Desalting Chemicals

The Tretolite Company pioneered the use of chemicals in crude oil desalting, and developed the first desalting system in which chemicals provided emulsion destabilizing action.

Refiners all over the world now rely on TRET-O-LITE for efficient, economical desalting performance.

TRET-O-LITE Desalting Chemicals also are widely used in chemical-electric desalting, as well as chemical aid to electric desalting when certain adverse treating conditions are encountered.

Ask your Tretolite Refinery Service Engineer about the economy of TRET-O-LITE *Desalting Chemicals.*

KONTOL*Corrosion Inhibitors

KONTOL Corrosion Inhibitors are liquid organic semi-polar compounds available in a variety of formulas. They adsorb at metal surfaces to form an impervious corrosion-inhibiting film. KONTOL Corrosion Inhibitors prevent corrosion in refinery equipment by protecting against attack by chlorides, sulfides, organic acids and hydrogen blistering. They are effective detergents and provide an economical means for maintaining cleanliness and heat transfer efficiency in condensers and exchangers.

KONTOL *Corrosion Inhibitors have been cutting maintenance costs for refiners for many years. Complete information is yours on request.*

TOLAD*Fuel Additives

TOLAD Fuel Additives are ashless, totally oil-soluble compounds. They stabilize color in heating oils and diesel fuels. They effectively disperse the insoluble solids which form sludge and impair burning qualities.

TOLAD additives have excellent water tolerance characteristics which prevent loss to water bottoms in fuel storage. They are available as inhibitor or inhibitor-dispersant formulations. TOLAD is approved, and used, by leading railroads.

Get all the facts on this new Tretolite product. In test after test, TOLAD *has provided better fuel stability at lower cost. Why not prove this to your own satisfaction—and profit.*

For complete information on these, or any Tretolite Company product or service, ask the Man in the Red Car, or write

*Registered trademark of Petrolite Corporation

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CORPORATION

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200 South Puente Street, Brea, California

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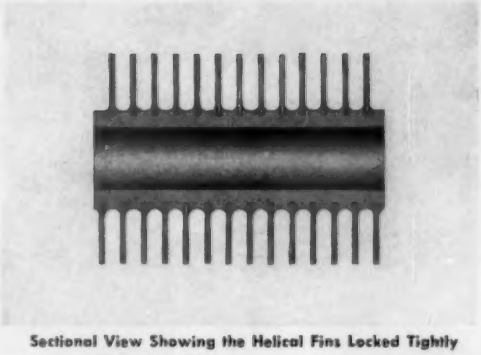
NEW

G-R LARGE DIAMETER *K-Fin Tubing*

FOR PROCESSING FURNACES

● G-R large diameter K-Fin Tubing is designed specially for use in the convection sections of furnaces heating petrochemicals or hydrocarbons for processing. They provide 10 times or more surface area than plain, bare pipe or tubing, increasing the capacity of the furnace, the efficiency of the furnace, or both.

Service-proved G-R construction. Helical fins are wrapped tightly into grooves plowed on the outside of the tube or pipe. The metal displaced by the grooves is then forced tightly against the sides of the fin to form a tight metal-to-metal bond. Suitable for any service for which bare pipe or tubing is satisfactory. 1″ to 6″ sizes; 2 to 8 fins per inch. Carbon steel, stainless or alloy fins on carbon steel, stainless or alloy pipe or tubing, to meet your exact requirements.



Sectional View Showing the Helical Fins Locked Tightly into the Wall of the Tube.

Write for Bulletin No. ES-2 Today! Technical Data Available for Rating Engineers.

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WHEREVER STREAM BLENDING IS INVOLVED

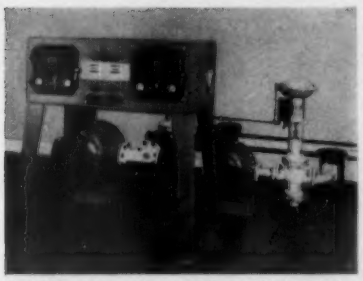
Automatic stream blending is our business . . . whether it be a simple two component system or a multicomponent system for blending gasolines, jet fuels, solvents, lube oils, waxes, residual fuels or asphalts. Performance-proved Proportioneers blending systems are designed by men who recognize a problem and dare to pioneer new concepts. With 30 years of field application and manufacturing experience, B-I-F offers the petroleum industry the most comprehensive source of stream blending data available.

Through constant research in continuous processing, B-I-F has developed a wide line of compatible system components. From this line, B-I-F can custom-build a stream blending system to accommodate your most exacting specifications at minimum cost.

Continuous automatic blending systems offer greater operational flexibility, provide tailor-made end products on the spot, reduce intermediate tankage and end product storage. If you have a blending problem, find out how a B-I-F engineered system can add more profit to your operation! Write **B-I-F Industries, Inc. 377 Harris Avenue, Providence 1, Rhode Island.**

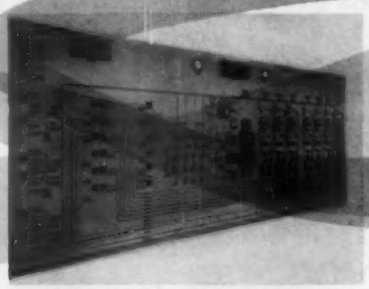
METERS • FEEDERS • CONTROLS / CONTINUOUS PROCESS ENGINEERING

FUEL OIL Base stocks at terminals or loading racks are blended at twist of a dial . . . directly from storage to tank trucks, tank cars or barges . . . automatically, safely, accurately!



ASPHALT Penetration blends or asphalt cutbacks are continuously blended in a single-pass operation at loading racks direct to tank truck without intermediate storage and within state specification.

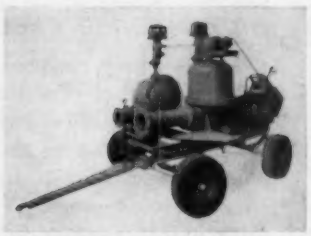
LUBE OIL Continuous recirculation-type fail-safe Panel Blenders . . . compound specification lubes and additives at minimum production costs . . . increase operating efficiency and formulation accuracy . . . reduce tankage.



GASOLINE Explosion-proof Panel Blenders, close-coupled or remote, continuously proportion base stocks, dyes, additives, and TEL with fingertip control over any formulation in any quantity. Error-free, fail-safe operation.

ADDITIVES A complete line for automatically proportioning additives to gasoline, lubricating oils, fuels, etc.; including economical proportioning pumps and flow responsive metering systems.

JET FUEL Automatic in-line Panel Blender . . . remote transmission . . . minimum installation cost, maximum flexibility, high accuracy, economical fingertip formulation.



BUNKER FUEL Mobile units . . . for continuous, automatic, "on-the-spot" blending of specification bunker fuels directly from base stock storage to ships' bunkers.

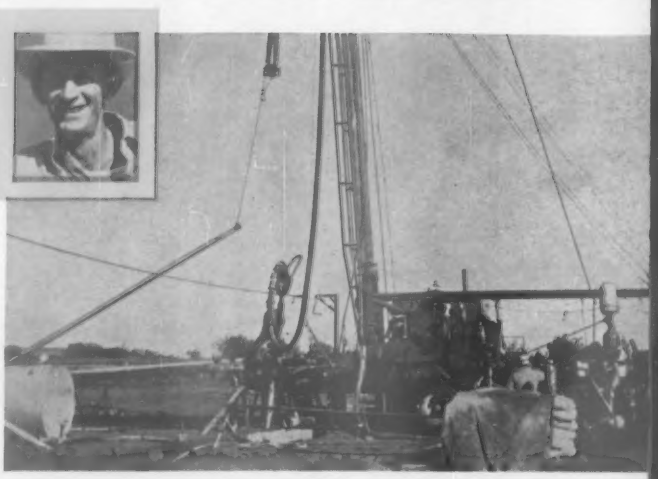
ELECTRONIC BLENDING In multicomponent blending systems, the B-I-F Electronic Console provides remote operation with maximum control in minimum space at minimum cost. Entire blending operation, supervised by a single qualified technician, effectively provides "Laboratory Control" of entire operation. Is applicable in the gasoline, lube oil and jet fuel operations illustrated above.

YOU NAME IT! When it comes to stream blending, a B-I-F specialist is ready to recommend and furnish estimates. See Thomas Register or Chemical Engineering Catalog for your nearest B-I-F representative.

Drillers "sound off" on power preference

"Our International runs like new after 15,000 hours!"

W. F. Hicks, Superintendent for Davis & Davis, Inc., Coleman, Texas, ran an International UV-549 V-8 for two years, 24 hours per day, on draw works, rotary table and cat head. "When we finally had a chance to take off the head and pan, we couldn't find any wear that could be measured, felt, or seen. That International still runs like new!"



"I like International engines because they can take it!"

Andrew Dickens, Partner, Valley Oil Co., Cottula, Texas, backs his preference for International with 35 years' experience in the oil fields. He has four IH engines on this spread—a new UDT-817 and a UD-525 on mud pumps, plus two older and still efficient International diesels on drill and draw works.

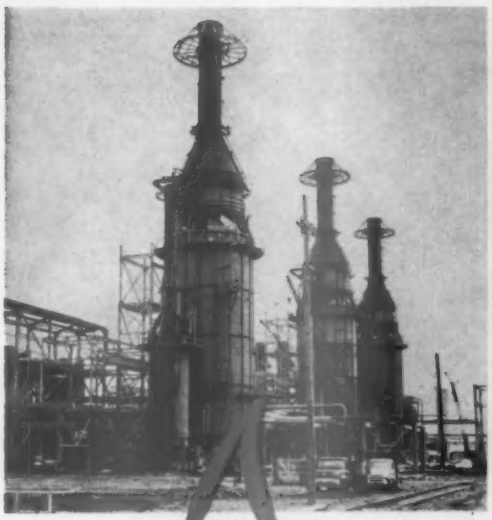
"Experience proves International performance excellent!"

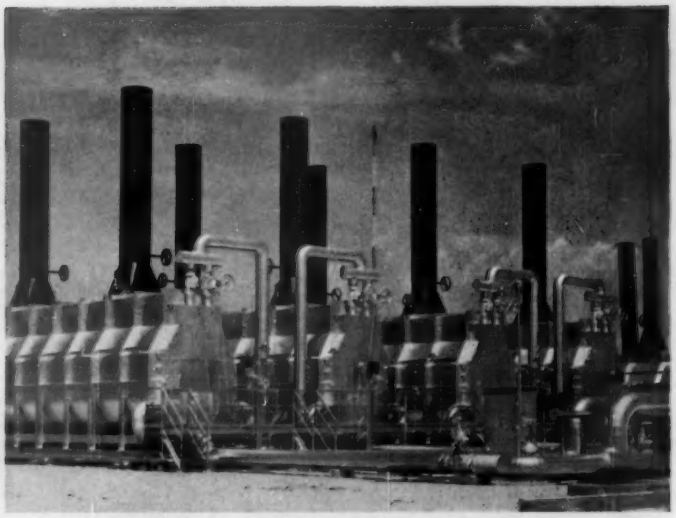
C. M. Pumphrey, Producers Well Service, owns three IH-powered rigs operating out of Bolling, Texas. "We get fast service and parts delivery from our IH Distributor!" says Mr. Pumphrey, pointing out another International extra. The self-propelled unit shown here is powered by an International V-8, with a U-450 pumping salt water.

For power to match your jobs, see your nearby International Engine Distributor or Dealer. He'll show you 35 models in the IH line—16.8 to 385 max. hp—gasoline, natural gas, LP gas or diesel; with special factory-made attachments for job-matched oil field service. Call him soon!

INTERNATIONAL® ENGINES

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE





100,000 to 200,000,000 BTU

PETROCHEM VERTICAL AND HORIZONTAL DIRECT FIRED HEATERS

For the petroleum, chemical and petrochemical industries, Yuba now offers the most complete series of direct-fired heaters available. From 100,000 to 200,000,000 BTU per hour – from -200° to +2,000° F – Petrochem Vertical and Horizontal Heaters can be built in every size and type for every use in any location!

Yuba Heaters are available from the most simple horizontal design to the famous Petrochem vertical with optional reradiation cones for even heat distribution and maximum efficiency.

Working closely with both customer and prime contractor, Yuba can provide single piece, shop-assembled horizontal heaters *to 30,000,000 BTU*. Other heaters up to 50,000,000 BTU can be provided in two sections. For field installations of larger heaters, Yuba can provide well-trained supervisory personnel when desired. Get the complete story on Petrochem direct-fired heaters from Yuba – your largest single, fully-integrated source of supply.

Other Yuba Products For The Petroleum, Chemical and Petrochemical Industries—Adsco Expansion Joints, Transaire Air-Cooled Heat Exchangers, Shell and Tube Heat Exchangers, Southwest Floating Roof Tanks, Cone Roof Tanks, Pressure Vessels, Field Erection, Columns and Towers, Process Condensers, Custom Fabrication.

YUBA

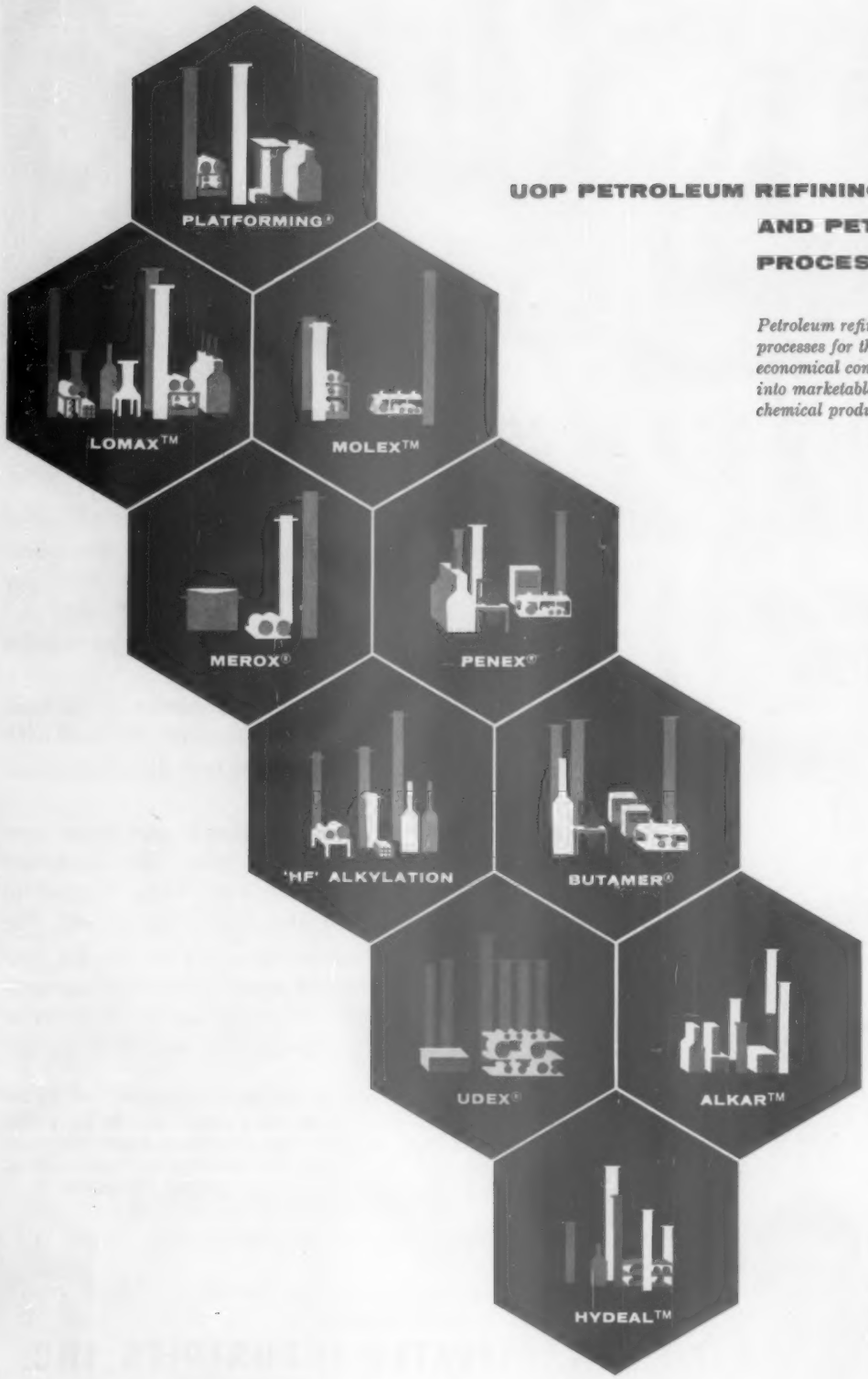
specialists in process heaters—every size, capacity and duty

YUBA HEAT TRANSFER CORPORATION
Tulsa, Oklahoma

YUBA CONSOLIDATED INDUSTRIES, INC.

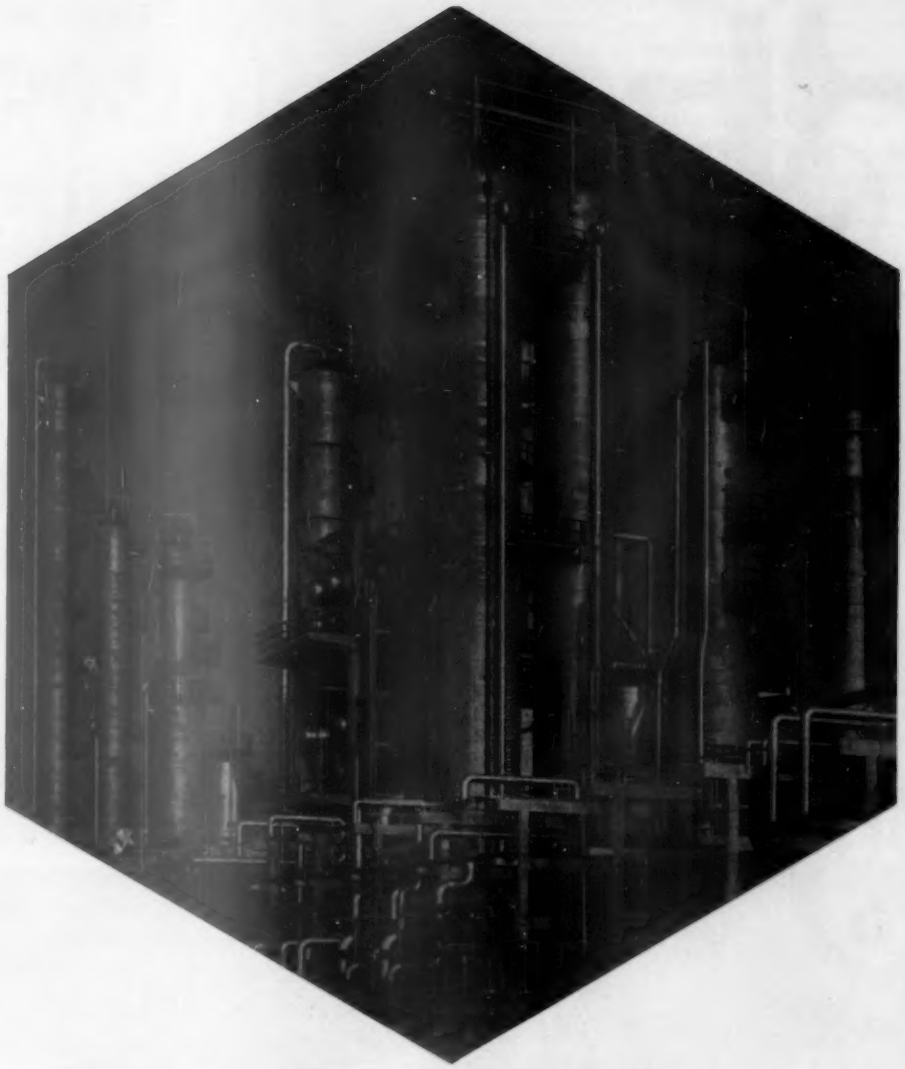
Sales Offices in Chicago • Houston • Los Angeles • New York • Pittsburgh • San Francisco

INTERNATIONAL LICENSEES: Birwelco Ltd., Birmingham, England (United Kingdom, British Commonwealth). Heurty Italiana, S.P.A., Milan, Italy. Societe Anonyme Heurty, Paris, France. Societe Anonyme Belge Heurty, Liege, Belgium. Fujinagata Shipbuilding Ltd., Osaka, Japan.



UOP PETROLEUM REFINING AND PETROCHEMICAL PROCESSES

Petroleum refining and petrochemical processes for the efficient and economical conversion of petroleum into marketable fuel and chemical products.



produce petrochemicals profitably with UDEX

UDEX® is being widely used by refiners throughout the world for profitable production of high purity petrochemical intermediates, benzene, toluene and xylenes. Udex aromatics meet the highest standards of purity. In addition, Udex is a valuable process for separating high and low-octane gasoline fractions to control the quality of finished gasolines.

Udex provides ideal market flexibility by enabling refiners to make products that meet changing product demands. Low utility consumption and low solvent costs make Udex unusually economical to operate.

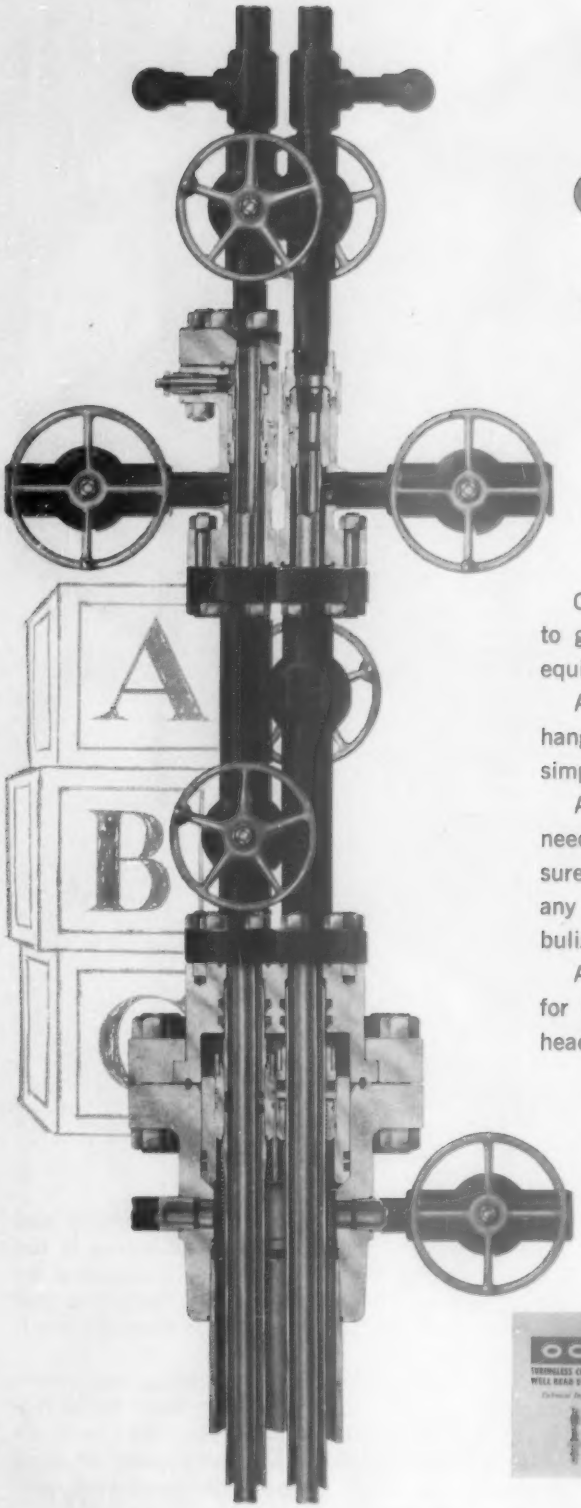
Udex has operational flexibilities too. Feed to a Udex unit can vary widely in both quantity and composition, yet the stringent specifications of the product output will be maintained. Originated by Dow Chemical Company, the Udex extraction process was developed and is made commercially available by UOP.

UOP offers a wide range of petroleum and petrochemical processes to refiners everywhere in the free world. A variety of technical services are also available to insure the profitable performance of these processes. Let UOP engineers evaluate your processing needs now.

WHERE RESEARCH TODAY
MEANS PROGRESS TOMORROW

UOP®

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U. S. A.



Tubingless Completions are simpler with O·C·T equipment

O·C·T tubingless completion equipment is designed to give you simplicity and flexibility that simplify your equipment problems.

A complete line of interchangeable slip and threaded hangers lets you suspend from one to eight tubing strings, simply by changing hangers.

A variety of casing heads for these hangers meets your needs for single or multiple completions, at working pressures up to 10,000 psi. Master Bushings allow assembling any desired multiple completion and permit running turbulizers, centralizers or other related downhole equipment.

A new type M (for macaroni) tubing head is supplied for hanging 1½-inch and smaller tubing strings. These heads can be furnished with either flanged or threaded connections on top and bottom. Crescent flanges, tri-flanges, and quadri-flanges are available.

If you want to use an economical tubingless completion on your next well, talk with your nearby O·C·T representative. He can show you the latest in tubingless completion equipment.

Write for the helpful free booklet, "O·C·T Tubingless Completion Well Head Equipment," which discusses requirements for tubingless completion equipment.

where progress is a daily practice

O·C·T

OIL CENTER TOOL CO.

SUBSIDIARY OF FMC CORPORATION

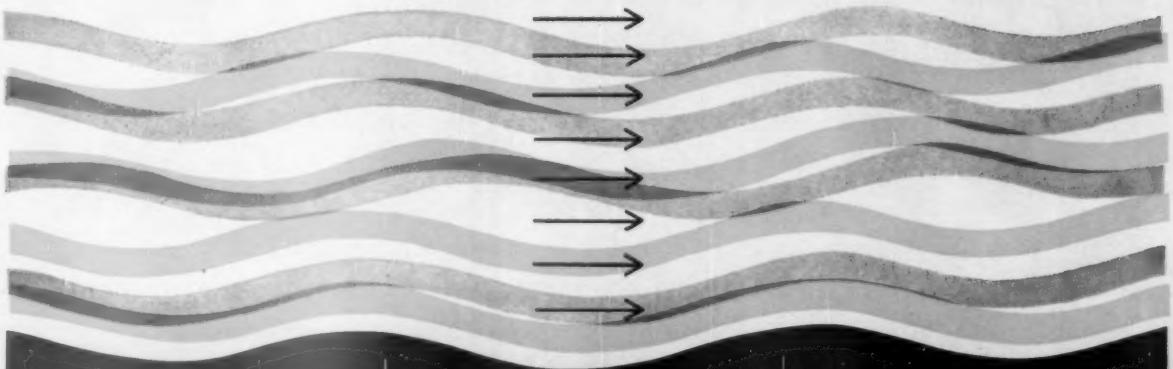
Address Export Inquiries for All Countries to P. O. Box 3091, Houston, Texas

Honeywell announces the NEW series 1400 low flow control valve

The addition of the new Series 1400 valve body to the Honeywell line of control valves now gives you a choice of actuator-body combinations to match your applications. Now you can choose the exact type and degree of control you need, without pushing a valve beyond its design limits . . . or without paying for more performance than you need.

The compact Series 1400 valve body is available in a full range of materials, ratings and sizes, with screwed or flanged ends. It can be used to regulate small flows in process, pilot plant, research and commercial control systems. Each body size (½", ¾" and 1") has a wide range of reduced ports with Cv's from .025 to 11.0. Two bonnet constructions facilitate mounting of five types of actuators —three pneumatic and two electric.

Each actuator-body combination fits a different range of operating conditions and performance characteristics, but with sufficient overlapping of these ranges to give you a wider selection on the basis of cost. For complete details, write for Bulletin B803-1. MINNEAPOLIS-HONEYWELL, Fort Washington, Pa.



Model 1401 Low Flow Valve with heavy-duty pneumatic actuator for systems requiring high shut-off ratings and accurate valve positioning.

Model 1403 Low Flow Valve with compact, light weight pneumatic actuator for average industrial and commercial control systems.

Model 1404 Low Flow Valve with reduced port Cv's to .025 and top-mounted positioner integral with pneumatic actuator.

Model 1406 Low Flow Valve with *Modutrol* capacitor-type, electric motor actuator for two-position, floating or proportional control.

Model 1407 Low Flow Valve with heavy-duty *Actionator* electric motor actuator provides more power for higher valve shutoff ratings.

Honeywell

H First in Control

HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

Ammonia: Tonic for Tired Earth

-and for Petrochemical Profits

KELLOGG'S IMPROVED AMMONIA PROCESS NOW OFFERS MOST ECONOMIC AND EFFICIENT UTILIZATION OF LOW-COST RAW MATERIALS

The increasing need for inexpensive yet effective fertilizers throughout the world, combined with recent improvements in Kellogg's steam-methane reforming process, make the production of ammonia from low-cost hydrocarbon sources more attractive today than ever before.

Production efficiency and economics of Kellogg-designed ammonia plants have been vastly improved. Plants built by Kellogg cost less to install and operate. Feedstock range is wider and includes not only natural gas or cracked refinery gas, but reformer off-gas, propane-butane fractions, casinghead gasoline—even naphtha, under certain circumstances.

In gas preparation, Kellogg can design for any combination of waste heat recovery, and can achieve steam balance in the plant if desired. High pressure and low pressure feed can be used as economics dictate. In gas purification, Kellogg offers the optimum combination of methods to accomplish each step—including MEA and hot carbonate to remove CO_2 and copper liquor and methanation to remove CO.

For detailed description and economic data on Kellogg's steam reforming ammonia process, write for new brochure.

KELLOGG'S AMMONIA PLANT EXPERIENCE

Sterlington, Louisiana	150 T/D
Lake Charles, Louisiana	150 T/D
Ventura, California	160 T/D
Tuscola, Illinois	150 T/D
Lima, Ohio	300 T/D
Richmond, California	300 T/D
Medicine Hat, Alberta	100 T/D
Grand Couronne, France	100 T/D
Trinidad, B.W.I.	100 T/D
Joplin, Missouri	300 T/D
Lisbon, Portugal	180 T/D*
Cherokee, Alabama	360 T/D*

*Future

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York

A subsidiary of Pullman Incorporated

Offices of other Kellogg companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires

POWELL MAKES IT A SIMPLE MATTER

To find the right valve, for the petroleum industry, just call Powell. It's that simple, since Powell offers industry's most complete selection of valves in bronze, iron, steel, and alloys to control the flow of water, oil, gas, air, steam and corrosive fluids.

What's more, you don't have to wonder about Powell performance. It's built-in through sound engineering, development, materials and workmanship.

So, remember, finding the right valve can be a simple matter when you specify Powell Valves. For further information, call your nearby Powell Valve Distributor (there's one in every major city), or write us direct.

115th year of manufacturing industrial valves for the free world

POWELL PETROLEUM **VALVES**

THE WM. POWELL COMPANY CINCINNATI 22, OHIO

SHORT COMPACT RUGGED

GUIBERSON'S SHORTY TENSION PACKER *for* WATER FLOODING

Here is a rugged, low-cost retrievable tension packer that's short and easy to handle. Uncomplicated and functional in design, it's easy to set, space out and spot . . tension set by pulling on tubing string. And Guiberson's shorty tension packer is priced to cut your costs . . designed especially for water flood injection wells.

SAFETY JOINT COUPLING: right hand release S round thread for added safety.
ANCHOR CAGE: one piece malleable iron.
MANDREL: full opening heavy one piece seamless steel tubing.
LATCH: dependable J-slot mechanism, shock-absorber equipped, independent of safety joint operation.
FRICTION PADS: heat-treated pearlitic malleable iron.
SLIPS: heat-treated alloy steel.
HEADS: drillable cast iron.
RUBBER: specially compounded to withstand the most rugged oilfield use at high pressures and temperatures—built-in ability to return to original shape.
THIMBLE: drillable cast iron.
SAFETY RELEASE NUT: predetermined tension load at packer strips out, leaving safety nut, thimble, rubber and head—all drillable.

Better be Safe than Sorry — go Guiberson

THE GUIBERSON CORPORATION
DALLAS, TEXAS, U. S. A.

SAFE THAN SORRY BETTER BE'S UIBERSON

PRODUCTION, DRILLING AND WORKOVER SPECIALTIES, MOLDED RUBBER PRODUCTS

DRESSER INDUSTRIES INC.

OIL • GAS • ELECTRONICS CHEMICAL • INDUSTRIAL

"Made OF Stainless Steel ...Made BY Jenkins"

Valve Performance Shows the Big Difference in that Spec!

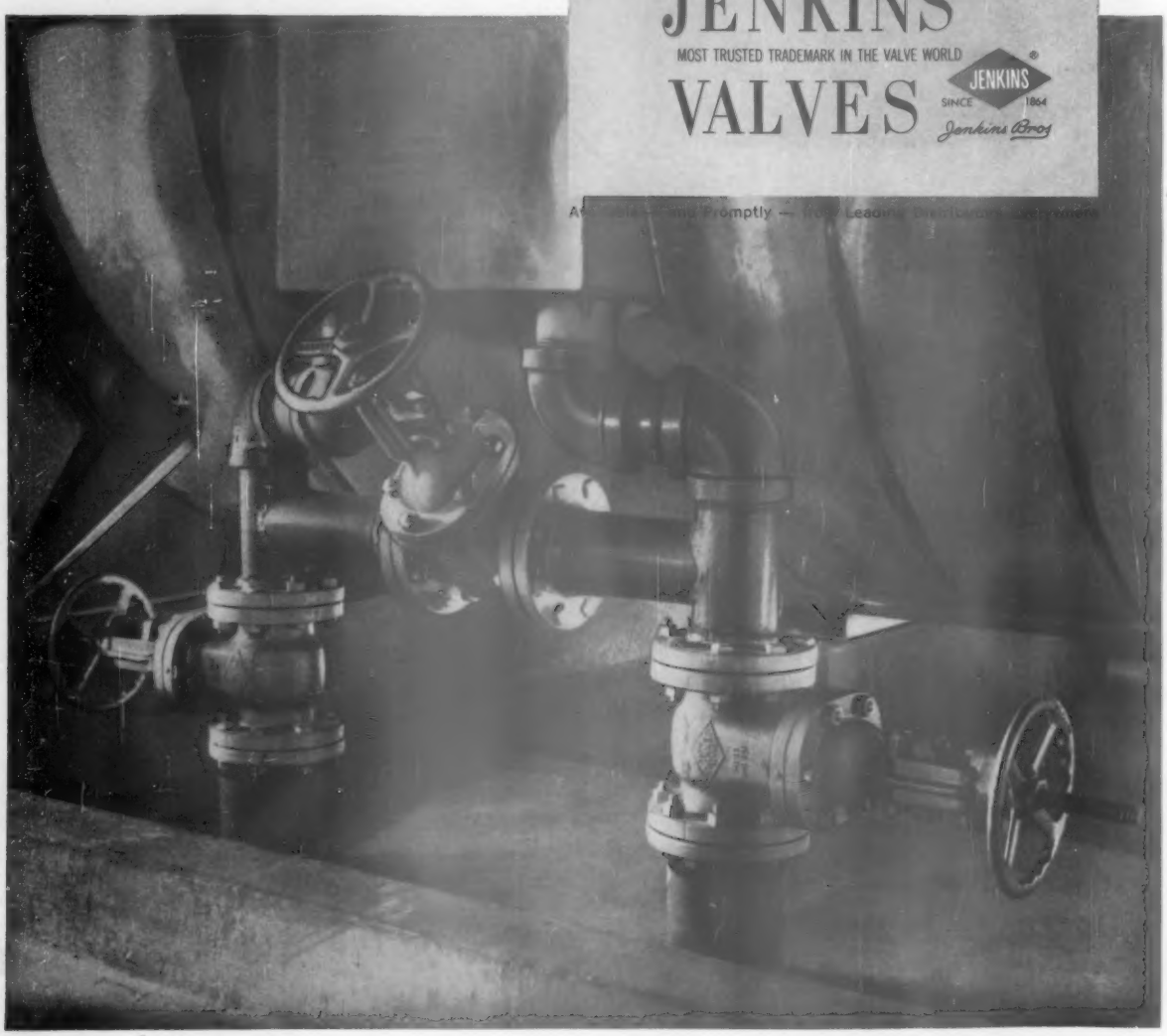
When service conditions require valves of Stainless Steel, remember that metal is only part of the answer to long, dependable valve performance.

The WAY valves are made is equally important. Factors you can't even see make a big difference. Such factors as *perfection of castings . . . precision machining . . . painstaking inspection and testing . . . sound design.* Most important of all: *the maker's guiding policy about quality.*

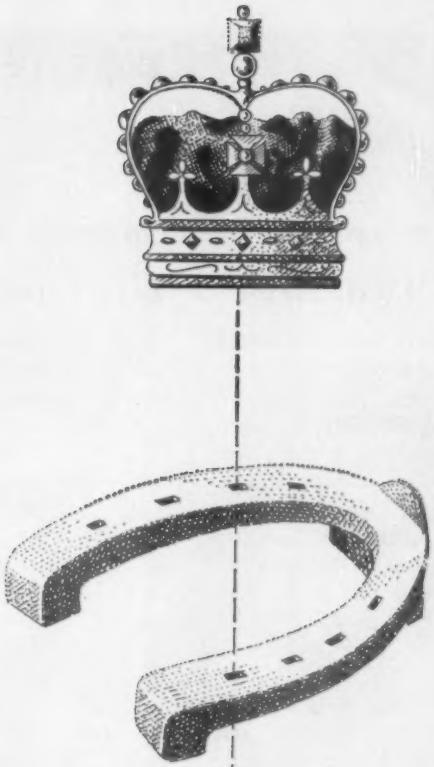
***To be sure* about all these critical factors, experienced specifiers and buyers specify JENKINS as well as the metal alloy when Stainless Steel valves are needed. It is well-known that for almost a century Jenkins has made valves to *just one* standard of quality . . . the highest. At Jenkins every operation, every worker is aimed at fulfilling that standard, whatever metal a valve is made of.**

SEND FOR NEW CATALOG 59-SS of Jenkins Stainless Steel valves in types and alloys to satisfy most needs. Jenkins Bros., 100 Park Ave., New York 17.

JENKINS
MOST TRUSTED TRADEMARK IN THE VALVE WORLD
VALVES
JENKINS SINCE 1864 Jenkins Bros



"For want of a nail
the shoe was lost
For want of the shoe
the horse was lost
For want of the horse
the rider was lost
For want of the rider
the message was lost
For want of the message
the battle was lost
For want of the battle
the kingdom was lost"



FOR WANT OF A NAIL THE KINGDOM WAS LOST!

The modern version of this old adage might begin, *"For want of a bearing . . . ," or "For want of a valve . . . ," or*

"For want of a part,
your product was lost!"

Large losses may result from small things. A gas-engine compressor consists of about 1400 individual parts, each important to the operation of the machine. The parts are like links in a chain — the dependability of the whole is only as good as the weakest part.

Every part of an Ingersoll-Rand compressor, or *any* machine that will carry the I-R trademark, is designed and manufactured for top dependability and performance in relation to every other component. But no mechanical wearing parts will last forever, and eventually some must be replaced. Then the machine can be restored to its original condition *only* with genuine Ingersoll-Rand replacement parts.

Today, through Ingersoll-Rand's newly-expanded service facilities, spare parts for engines, compressors and pumps are readily available from warehouse stocks in all principal cities, as well as from enlarged service departments at I-R plants. For fast service and *dependability,* just call your I-R representative.

Ingersoll-Rand
295-A-14 11 Broadway, New York 4, N. Y.

COMPRESSORS • ENGINES • PUMPS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS AIR & ELECTRIC TOOLS

Improve your Engineering I.Q.*

* INCOME QUOTIENT

Impact a result of contact: Public Speaking not an end, but a vital means to an end

There certainly is no better tool in developing executive or management qualifications than through public speaking. Spoken words are a powerful tool of business. They are used to organize, motivate, coordinate, control, and train.

Since an executive must achieve results through people, he must be able to plan and organize. As a leader, he must be able to motivate and inspire people to action; he must make himself understood. He must have purpose and the will to make other people aid that purpose.

A speaker, too, achieves his results through people. He, too, must be able to plan and organize; must lead; must be able to motivate and inspire others to action; must make himself understood. The speaker must have a purpose and the will to make others aid that purpose. The skills of the executive are identical with those of a speaker, in these areas.

It is not surprising, then, that aspiring leaders in business and industry are judged by their associates and superiors, to a great extent, by their abilities to communicate. It is not surprising that an executive can sell himself, can attain greater authority by broadening his capacities for directing and leading, through oral communication.

Words have great power, particularly the spoken word. Words give you contact with other men, and if you use them effectively, they give you — *impact*. That impact is multiplied as you develop your ability to speak, and as you speak to more important audiences.

If you are a novice in public speaking you are not alone. No more than 25 per cent of our speakers could qualify as "veterans."

Like conversation, speaking before an audience is based on sincerity and belief. It involves conviction and concern. The public speaker is most convincing when he is least artful, when he is most natural, and above all, when he is sincere.

Effective speaking is not an accident. It is not the special endowment of a few. While talking before many listeners may come naturally for a few, it is, by and large, a learned art. It consists of an idea, phrased simply, and delivered with conviction and with an expressive voice.

WRITE FOR YOUR COPY TODAY

. . . the growth of engineering leadership in the process industry is of great importance to Western, because tomorrow's executives in the petroleum and chemical process fields are our prospective customers . . . Experience in our own organization has taught us the impact of clear and forceful expression of original ideas and solutions to heat transfer problems, and we have thus recognized the importance of learning to speak to audiences of all sizes . . . We've devoted another of Western's "professional development" booklets to this timely subject, and a copy awaits you without obligation . . . Also without obligation, we offer our assistance in the solving of your next heat transfer problem.

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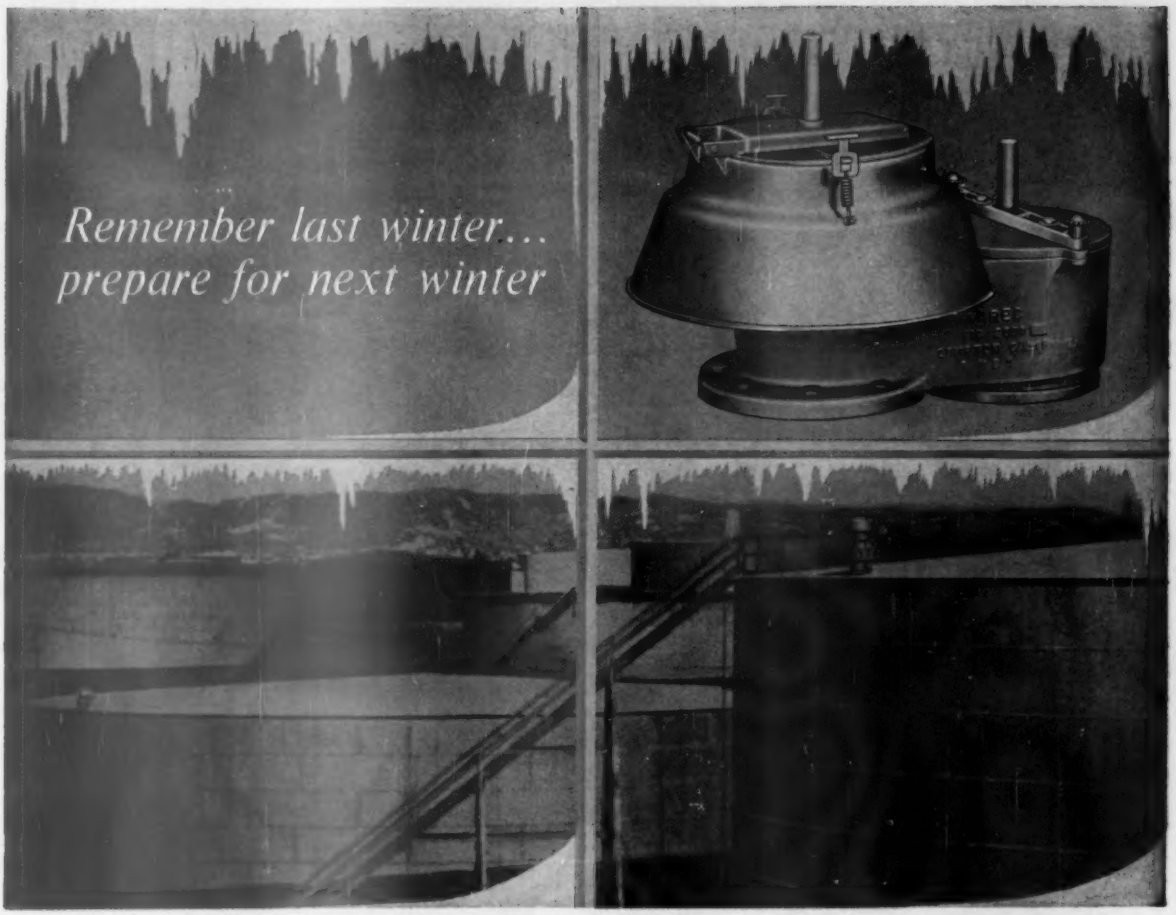
WESTERN SUPPLY COMPANY
P.O. Box 1888 – Tulsa, Oklahoma



MODERNIZE YOUR TANK FARM NOW

with the new Varec All-Weather Breather Valve that works perfectly in -60° winters and +125° summers.

Here's all-weather performance that's been *proven* through two full years of Eastern Canada's roughest climate...frigid winters...hot, humid summers. Yet never once did Varec's rugged new Fig. 2000-61 ALL-WEATHER Breather Valve fail to operate perfectly. What's more, this petro-chemical plant can look forward to the continuation of this 100% performance for many tough seasons to come.

By modernizing your tanks with this new Varec ALL-WEATHER Breather Valve, you are now assured of tank safety and vapor saving efficiency *the year around.*

NEW FIG. 2000-61 MODEL...
TWO-WAY PROTECTION AGAINST FREEZE-UP.
Here's how Varec engineers have solved the cold-weather problem: First, both pressure and vacuum pallets utilize a flexible diaphragm of special non-frosting, icing-resistant material. This eliminates possible freezing between pallet and seat ring.

Second, a special non-frosting, icing-resistant compound is used to coat the pallet perimeter and stem, guide-posts and tip of seat ring. Ice and snow scrape free when the pallet lifts.

For complete information on the Varec Fig. 2000-61 ALL WEATHER Breather Valve, write for Varec Bulletin No. CP-2701, Dept. OGJ-1500-5

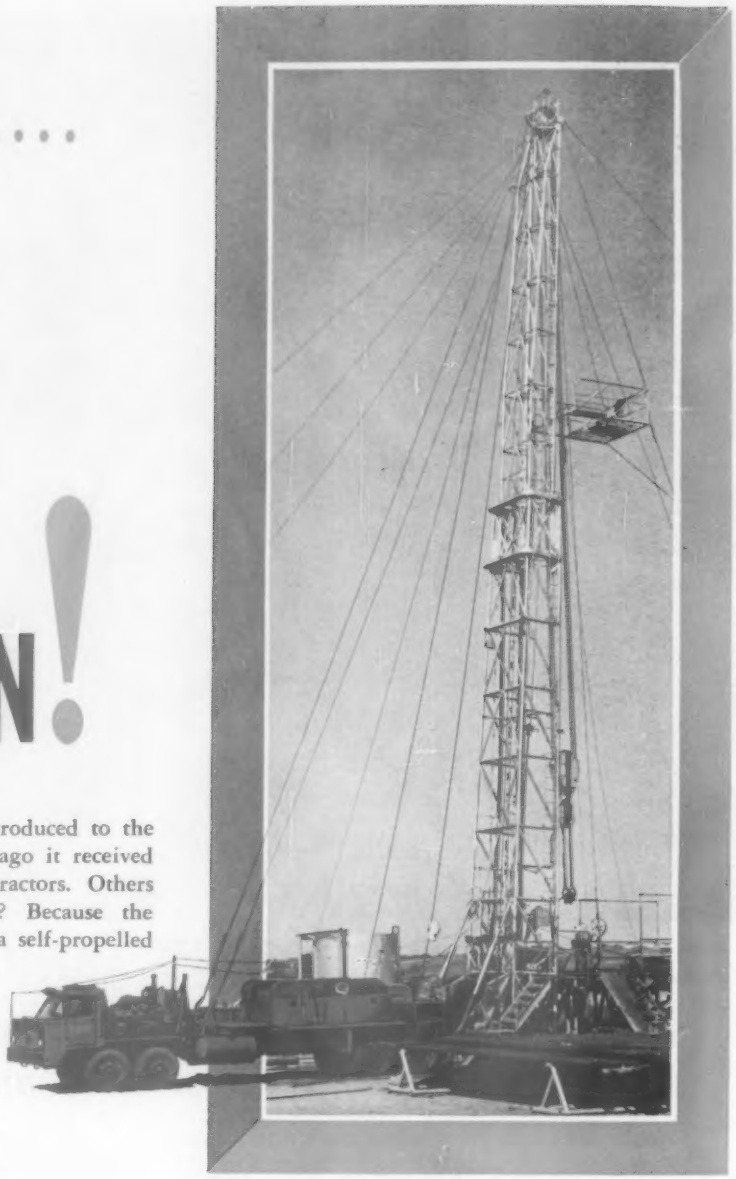
Varec
TRADE ◉ MARK

THE VAPOR RECOVERY SYSTEMS COMPANY
2820 North Alameda Street · Compton, California

Branches and Representatives in Principal Cities

Franks Explorer....

NOW FULLY FIELD PROVEN!



When the Franks Explorer was first introduced to the well servicing industry some two years ago it received immediate acceptance from many contractors. Others assumed a wait-and-see attitude. Why? Because the Explorer was a totally new concept — a self-propelled unit primarily designed as a servicing and workover rig, and mounted on a rugged carrier for secondarily designed to over the road travel. Here was the promise of new speed, more horsepower, greater flexibility. The "wait-and-see" groups settled back to watch.

AND WHAT DID THEY SEE?

Within two short years they saw the Franks Explorer outsell all competition. They saw themselves joining that first group of contractors who accepted the Explorer immediately — who knew Franks' reputation for building good equipment and for delivering what is promised.

If you're still from Missouri, ask the man who owns a Franks' Explorer. Or, better still, call your Franks' representative for all the details.

WELL SERVICING AND DRILLING UNITS
FRANKS
PAMPA, TEXAS
CABOT

CABOT CORPORATION
MACHINERY DIVISION

Worth more when you BUY 'EM . . . Worth more when you TRADE 'EM

ASK PHILADELPHIA!

Adding or removing heat in a process mixing operation is tricky. Improper baffling in any mix may permit swirling and drastically reduce the efficiency of coil type heat transfer surfaces.

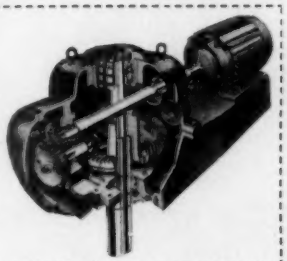
With viscous liquids, particular care is needed. Because stagnant zones must be avoided, baffling may have to be reduced or eliminated . . . and impeller size and speed must be chosen carefully to minimize swirling.

Want help with a critical process? Try Philadelphia. Philadelphia's engineering staff has dealt with hundreds of unique applications—can find new answers *fast* through skilled pilot process research.

Good General Rule: In promoting heat transfer, determine the flow pattern that will give the best transfer conditions—then get the mixer that provides it.

Best General Rule: Ask Philadelphia about mixers *and* mixing. Philadelphia Mixers do what they're sold to do. Philadelphia Mixers *mix.*

Here's the Secret of trouble-free mixing: gears precision-ground to master gear perfection. Tougher, quieter, more powerful—the best mixer drives made are made by Philadelphia.



Get Facts—and plenty of them—on mixer design, construction, and specification. Sections of *Fluid Mixing Practice* and *Process Mixing Technology* detail steps you can take to improve process efficiency. Read how to be sure of correct mixer design every time. Request 64-page Catalog A-19 on your letterhead today.

PHILADELPHIA MIXER

DIVISION OF PHILADELPHIA GEAR CORPORATION

King of Prussia (Suburban Philadelphia), Pennsylvania

ASK ANY ENGINEER / GEARS ARE THE HEART OF A MIXER

AGMA MEMBER

THE EXTRA MEASURE

PHOTOGRAPH BY PAUL WELLER

Thoroughness. By a steelmaking specialist ■ On Lukens' 206-inch mill the world's largest steel plates are improved by the cross-rolling technique. Rolled lengthwise. Carefully measured. Turned and rolled sideways. Measured again. Lukens' cross-rolling procedure develops more uniform metallurgical properties. The extra measure of strength and quality essential to the fabricators of vital steel plate projects ■ Thoroughness is a Lukens habit, as well, in researching the best steels for difficult applications. Working with your engineers on problems of design and fabrication. Helping you select the best steel for the job from Lukens' complete line of carbon, alloy, armor and clad steel plates. Heads. Plate shapes ■ Thoroughness is one of many characteristics that make Lukens

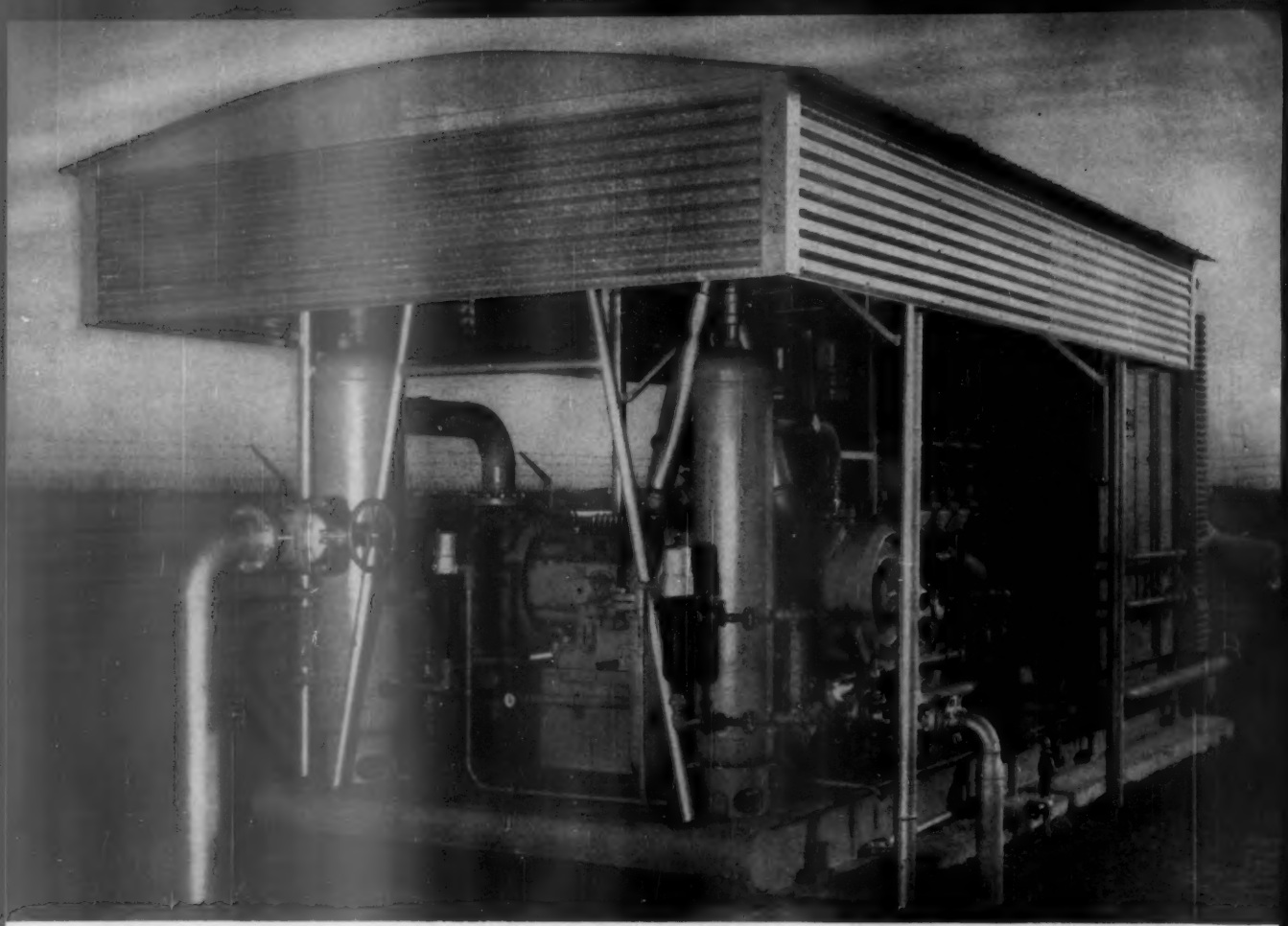
LUKENS STEEL

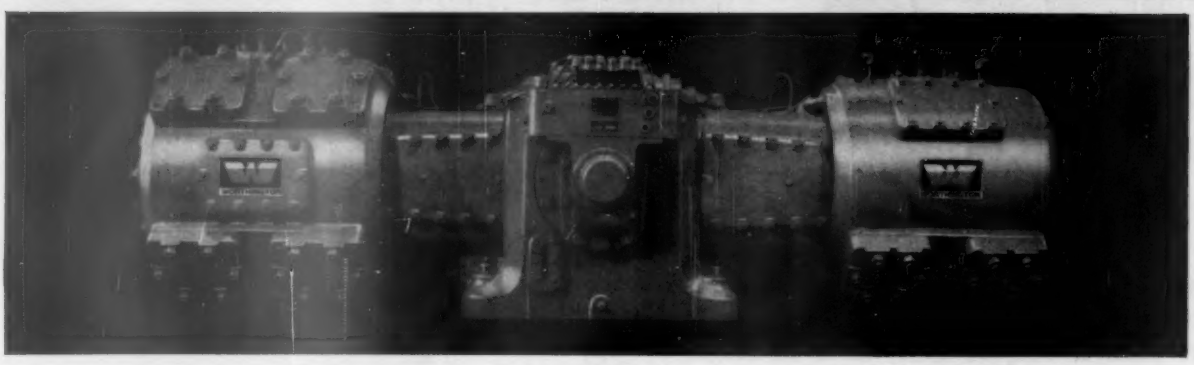
THE SPECIALIST IN PLATE STEELS

Contact Manager, Application Engineering, 43-C Services Building, Coatesville, Pa.

Hawaii bids "Aloha" and a warm welcome to a new star in the Islands... Texaco. Shown here receiving a traditional greeting are the first of the Islands' new Texaco Dealers and their able assistants. Only Texaco, at the sign of the big red star with the green T, serves motorists in all 50 states of the U. S. A. Texaco, pioneer and one of the leading producers, refiners and marketers of petroleum, takes pride in serving Hawaii, and continuing its capital investments in the economies, the people and the progress of the Free World.

TEXACO: SYMBOL OF WORLD-WIDE PROGRESS THROUGH PETROLEUM





SHOULD YOU TAKE GAS FROM A WELL?

There's a big difference in opinion about when it is profitable to take gas from a well. It depends on price contracts, on company policy of time limit on payout, on alternatives for capital investment and on other factors, such as the economics of the well itself. To lower your well cost picture, Worthington now offers the new CUB compressor.

Through a wide range of cylinder sizes, the CUB handles over 85% of gas field needs. The cylinders are designed for extremely fast field changes to meet changing capacities and pressures.

The CUB cylinder-and-piston arrangement is balanced-opposed. This cuts vibration to a level below other compressor designs. It reduces supporting base requirements and lengthens compressor life.

Main crankshaft bearings in the CUB are the more expensive, spherical-roller-bearing type. You'll find it runs with less friction, runs cooler, and maintains better full end-thrust control.

Lubrication in the CUB is improved, too. Oil is continuously cleaned by a built-in filter that is readily serviced without disturbing piping. All lubrication is done by a full, force-feed system. And crankcase oil is water-cooled down to a conservative operating temperature by an oil cooler enclosed in the frame itself.

You'll find, too, that the CUB is compact to make an easier installation. Piping is less, only one water inlet and two water outlets. There are no external oil pipe connections.

For more information on the CUB, write Worthington Corporation, Section 36-19, Harrison, N. J. In Canada, Worthington (Canada) Ltd., Brantford, Ontario. Or call your local compressor packager.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

Petrochemical Plants

from "on-paper to on-stream" with JGC

Japan Gasoline Co., can plan, design, procure, and build petrochemical plants around the world. JGC coordinates every detail at every step to deliver plants at maximum speed, within the budget.

Since 1928, JGC engineers planned over 600 projects from the ground up. These ranged from experimental pilot plants to multi-million dollar chemical, petrochemical, and petroleum refineries.

Some of JGC's current projects include a 45,000 T/Y Ethylene Unit and a 1,700 BPD Aromatic Extraction and Fractionation Unit.

If you plan to build a new process system or modify your present one, JGC's integrated operation can work to your advantage. For details write Japan Gasoline Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo.

JGC

Engineers & Constructors

JAPAN GASOLINE CO., LTD.

Process engineering from "on-paper to on-stream"

FIELD REPORT

SERVICE: LP-Gas Injection

Burnell—North Pettus Cycling Plant

PUMP: 1½" x 5" Aldrich Quintuplex

OPERATION STARTED: June, 1950

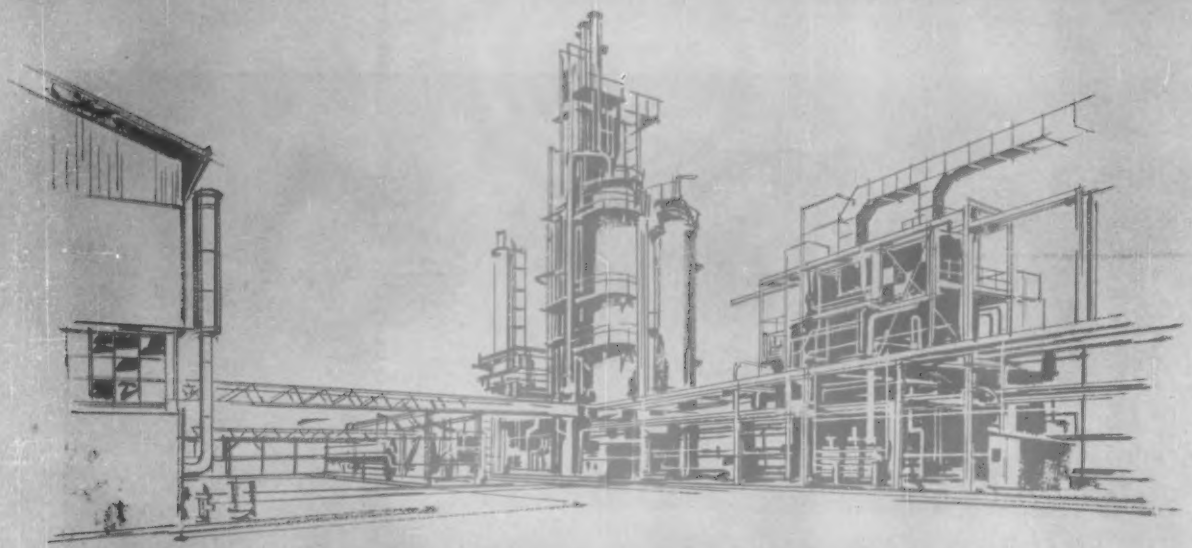
EXPERIENCE TO DATE:

Continuous service...pump delivers 52 gpm at 3000 psi. Routine maintenance annually...plungers are repacked as necessary. Customer reports: "complete satisfaction" with the performance of the Aldrich pump.

Field parts stock available in Carmi, Ill.; Calgary; Casper, Wyoming; Charleston, W. Va.; Houston; Los Angeles; Odessa and Tulsa. For further information, write the Aldrich Pump Company, 9 Gordon Street, Allentown, Pa.

the toughest pumping problems go to ALDRICH

SUBSIDIARY OF INGERSOLL-RAND



ISOLATE PIPE LINES ...ADD NEW EQUIPMENT

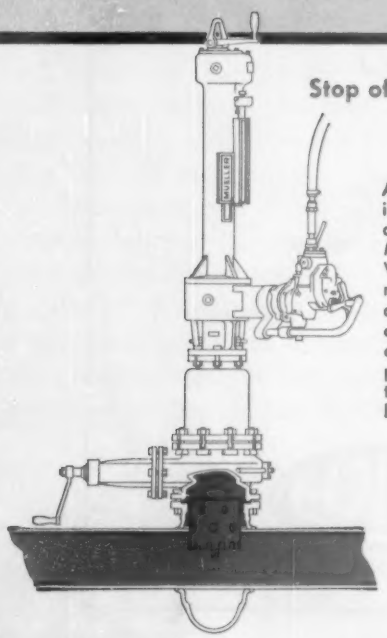
under pressure!

You can make repairs... isolate lines that need replacing... tie-in new piping... install new equipment—without interrupting flow or loss of production. There is no blowing of gas or fluids as you make permanent connections under full pressure and in complete safety.

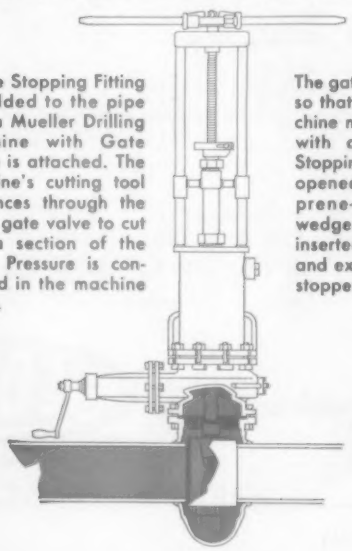
Mueller® No-Blo® methods and products enable you to work on piping systems whenever needed. A complete line of Mueller fittings, valves and equipment provides an answer to most every problem of working on lines under pressure.

Basic steps of Mueller No-Blo Methods are shown briefly in these illustrations...

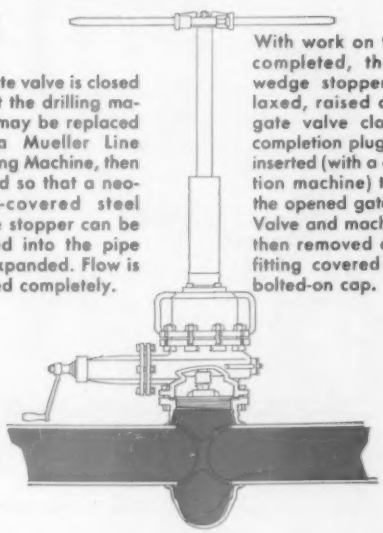
Stop off high pressure lines where no control valves exist—



A Line Stopping Fitting is welded to the pipe and a Mueller Drilling Machine with Gate Valve is attached. The machine's cutting tool advances through the open gate valve to cut out a section of the pipe. Pressure is contained in the machine body.

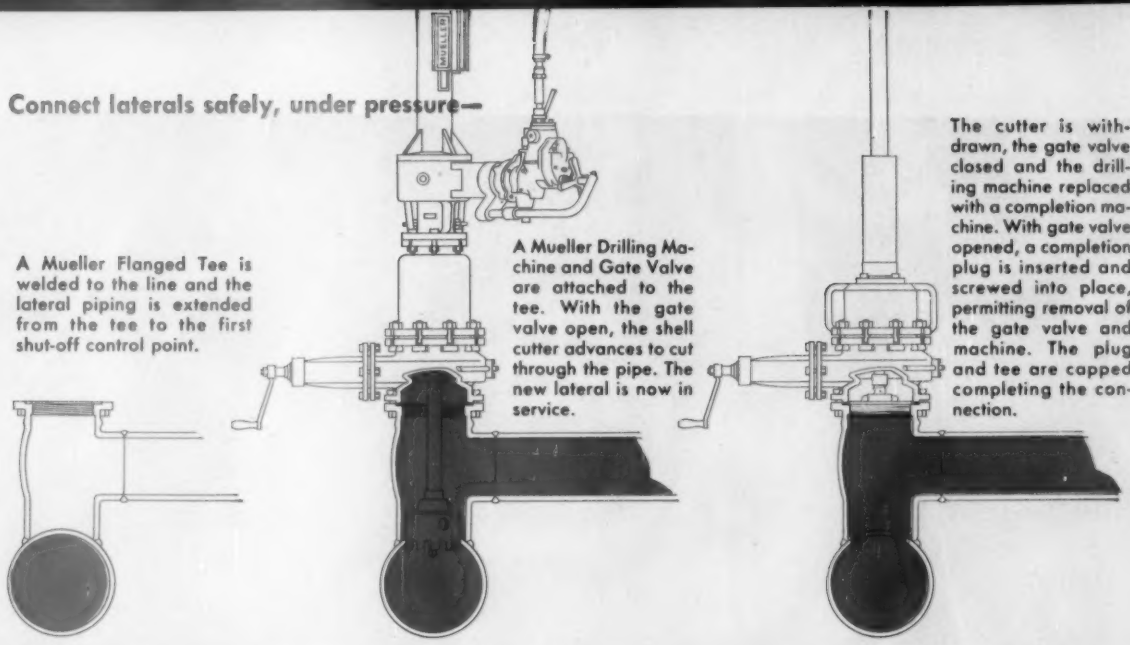


The gate valve is closed so that the drilling machine may be replaced with a Mueller Line Stopping Machine, then opened so that a neoprene-covered steel wedge stopper can be inserted into the pipe and expanded. Flow is stopped completely.



With work on the line completed, the steel wedge stopper is relaxed, raised and the gate valve closed. A completion plug is then inserted (with a completion machine) through the opened gate valve. Valve and machine are then removed and the fitting covered with a bolted-on cap.

Connect laterals safely, under pressure—

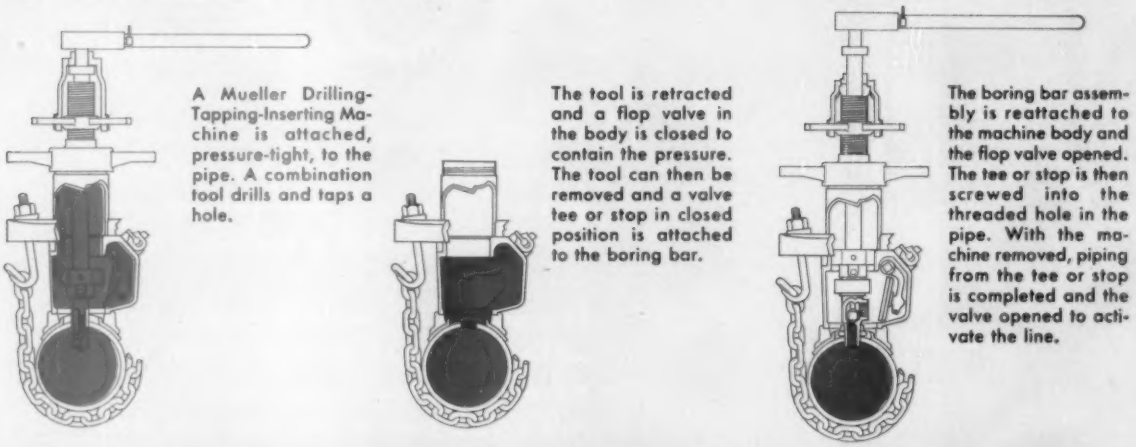


A Mueller Flanged Tee is welded to the line and the lateral piping is extended from the tee to the first shut-off control point.

A Mueller Drilling Machine and Gate Valve are attached to the tee. With the gate valve open, the shell cutter advances to cut through the pipe. The new lateral is now in service.

The cutter is withdrawn, the gate valve closed and the drilling machine replaced with a completion machine. With gate valve opened, a completion plug is inserted and screwed into place, permitting removal of the gate valve and machine. The plug and tee are capped completing the connection.

Tap a hot line without welding—



A Mueller Drilling-Tapping-Inserting Machine is attached, pressure-tight, to the pipe. A combination tool drills and taps a hole.

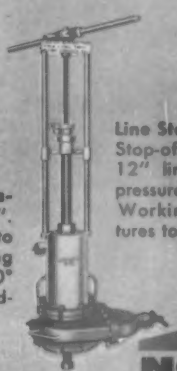
The tool is retracted and a flop valve in the body is closed to contain the pressure. The tool can then be removed and a valve tee or stop in closed position is attached to the boring bar.

The boring bar assembly is reattached to the machine body and the flop valve opened. The tee or stop is then screwed into the threaded hole in the pipe. With the machine removed, piping from the tee or stop is completed and the valve opened to activate the line.

Mueller No-Blo products to save time and money:

Large Drilling Machines—Cuts to 12". Working pressure to 500 p.s.i. Working temperatures to 500° F. Power or hand-operated.

Completion Machines — For fittings through 12". Working pressures to 500 p.s.i. Working temperatures to 250° F.



Line Stopper Units—Stop-off ¾" through 12" lines. Working pressures to 500 p.s.i. Working temperatures to 250° F.

Flanged Tees—Sizes from 3" through 8". Pressure ratings to 1200 p.s.i. Temperature ratings to 500° F.

Line Stopper Fittings — Sizes from ¾" through 12". Welding or mechanical joints. For steel, thin-wall steel or cast-iron pipe. Pressure ratings to 1200 p.s.i.

Valve Tees — Sizes through 2". Welding or threaded inlet and/or outlet. Pressure ratings to 1200 p.s.i. (Machine inserted Valve Tee — 250 p.s.i.)

Small Drilling Machines — Drill ½" through 2½". Working pressures to 1200 p.s.i. Working temperatures to 500° F.

NO-BLO®

MUELLER CO. Since 1857 SERVING the Water and Gas Industries QUALITY

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MUELLER CO.

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Factories at: Decatur, Chattanooga, Los Angeles
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Oil company reports PERFORMANCE PLUS with Sumitomo steel tubing

A leading drilling company in Texas reports that Sumitomo tubing far exceeded API specifications when run as drill string, despite 46 rugged round trips in and out of a 5700-ft. well under 1200-lb. mud pressure.

Performance like this shows why Sumitomo steel pipe and tubing, produced in accordance with API, ASTM and many other international standards, are exported in all sizes and grades to every major part of the world.

Available in API Standards in the following sizes:

Casing 4½" to 13⅜" O. D.
Tubing 1.660" to 4½" O. D.
Line Pipe 0.840" to 14.00" O. D.
High Test Line Pipe 6⅝" to 14.00" O. D.

LEADING MANUFACTURER OF STEEL TUBES AND PIPE WIRE RODS AND ROLLING STOCK PARTS

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UNION PIPE, INC.

(AGENT OF OIL COUNTRY TUBULAR GOODS IN U.S.A.)
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

Always ON DUTY

LimiTorque
FOR DEPENDABLE PUSH-BUTTON OPERATION

THE ABOVE 16" CRUDE OIL MANIFOLD VALVES OPERATE DAY AND NIGHT AT A NATIONALLY KNOWN SOUTHWEST PIPE LINE STATION

On a large majority of the high pressure oil and gas pipelines constructed during the past twenty-five years, you will find LimiTorque Motorized Valve Controls operating day and night—by the "mere push of a button" at conveniently located control points. One man can open and close all types of valves in remote, inaccessible or hazardous locations and thus save time, manpower and money . . . and due to its exclusive Torque Limiting Mechanism LimiTorque prevents any possible damage to valve operating parts, by shutting-off the current, should excessive torque be encountered.

LimiTorque can, in most instances, be readily field-mounted on existing valves with little added expense.

Contact your Valve Manufacturer or nearest LimiTorque Sales-Engineering Office for full information.

Send for interesting 16 page Bulletin #1-60, and please use your Business Letterhead when requesting.

THERE IS NO SUBSTITUTE FOR —
LimiTorque®

PHILADELPHIA GEAR CORPORATION
KING OF PRUSSIA (SUBURBAN PHILADELPHIA), PA.
Offices in all Principal Cities

PRECISION GEARS • INDUSTRIAL GEARS • SPEED REDUCERS • FLUID MIXERS • FLEXIBLE COUPLINGS
Limitorque Corporation • King of Prussia, Penna.

Maintenance and Steam Traps

. . . there's a relationship that goes far beyond trap maintenance alone

Good traps and good trapping have a greater effect on your maintenance costs than does trap maintenance itself. By that we mean that the right traps, properly selected and installed, and with the benefits of a preventive maintenance program, will save far more maintenance dollars than they will cost.

Under the pressure of spiralling maintenance costs, this thought becomes mighty important. Let's take a look at what it involves:

Proper Selection of Steam Traps

1. Be sure it's the right type of trap.
2. Be sure it's sized right and is for the correct operating pressure.
3. Be sure it's first rate in design and construction.

Proper Installation of Steam Traps

1. Install them so they are accessible for inspection and maintenance.
2. Install a test valve.
3. Use a union or unions.
4. Use a shutoff valve or valves.
5. Use a strainer ahead of the trap if dirt conditions are bad.
6. Use a by-pass only where continuity of service is imperative.
7. Standardize inlet and outlet connections.

Preventive Maintenance Program

1. Test trap regularly for proper operation. (Trap size, operating pressure and importance determine frequency.)
2. Inspect internal mechanism at least once a year.

You Get Indirect Benefits As Well

The direct benefits of the plan outlined are pretty obvious — good traps, properly selected, require less maintenance . . . testing and inspection prevents troubles that lead to maintenance.

However, this plan provides indirect benefits which reduce maintenance in other parts of the plant as well:

Good traps save steam and reduce the load (and consequently maintenance) on fuel handling and burning equipment and on ash handling equipment.

Good traps protect the system by eliminating water hammer and preventing the damage it can do.

Good traps discharge carbon dioxide before it can go into solution to form corrosive carbonic acid — less corrosion, less maintenance.

Good traps increase production to reduce the length of time equipment must operate or reduce the amount of equipment needed . . . either way maintenance is reduced.

How to Go About It (The Sales Pitch)

We admit we're prejudiced, but we don't think there is any better way to select steam traps than with the help of the 44 page Armstrong Steam Trap Book. Here in a single source is specific data on the selection and sizing of traps, how to install them for best results, and how to maintain them most economically.

The Steam Trap Book will also give you full information on the design and construction of Armstrong Inverted Bucket Steam Traps that offer these important maintenance-reducing advantages:

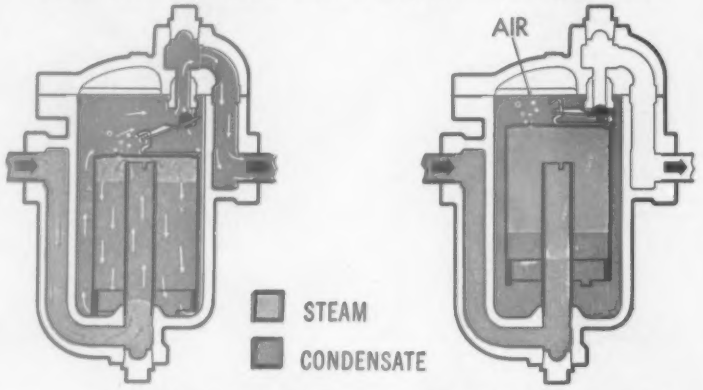
1. Armstrong Traps are dependable.
2. Armstrong Traps require no adjustments — go from full load to zero load automatically.
3. Armstrong Traps are self-scrubbing—ordinary dirt conditions can't hurt them.
4. Armstrong Traps have long-life parts — valve and seat are heat treated chrome steel — lever assembly and bucket are stainless steel.
5. Armstrong Traps have water sealed valves to minimize wire drawing and erosion.

Ask for your copy of the Steam Trap Book—there is no obligation. Then test Armstrong Trapping. If you are not completely satisfied with the results, you can return the traps for a full refund of the purchase price. You can't lose much that way. Call your local Armstrong Representative or Distributor, or write

Armstrong Machine Works
8685 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

HERE'S THE STEAM TRAP DESIGN
THAT CAN REDUCE YOUR MAINTENANCE PROBLEMS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

See our Catalog in Sweet's Plant Engineering File

4 "NEWS" for the SELECTIVE BUYER!

PACIFIC

types DS and DL

Double Volute

Double Suction

single stage centrifugal pumps

Write for Bulletin 143

PACIFIC PUMPS

Inc... A Division of Dresser Industries, Inc.

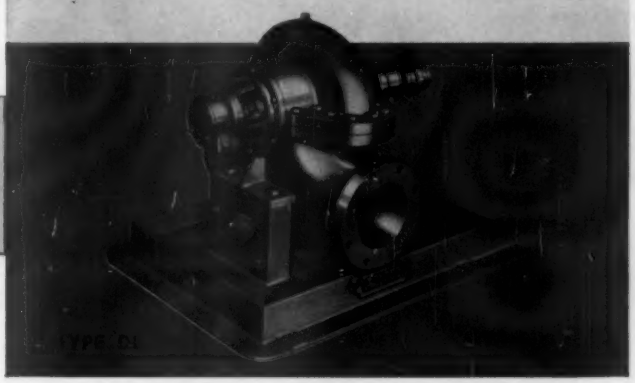
HUNTINGTON PARK, CALIFORNIA, U.S.A.

1 NEW QUALITY – All DS and DL pumps are skillfully moulded from meticulously fabricated patterns to provide smooth exterior and interior contours and controlled case thicknesses. All parts in contact with liquid being pumped may be fabricated from any commercially available ferrous or non-ferrous metal.

2 NEW DESIGN – Types DS and DL are *double volute* with double suction impeller. Shaft assemblies are dynamically balanced, radially and axially for minimum wear. Cases are axially split with nozzles cast integral with lower half. Type DS has provisions for water cooled packing boxes and bearings. Type DL is air cooled. Available with conventional packing or mechanical seals. Internal assemblies are mounted on only six shaft size groups for maximum parts interchangeability between pump sizes.

3 NEW PERFORMANCE – With a capacity range from 2,000 to 13,000 GPM and differential heads to 375 ft., the 22 sizes of type DS and the 13 sizes of type DL, make it unnecessary to compromise your specific pumping requirements – i. e., optimum efficiency with low NSPH.

4 NEW ECONOMY – Pacific types DS and DL pumps offer threefold economy. First, engineering skill and expert craftsmanship reduce the initial cost appreciably. Second, the balanced hydraulic design results in minimum wear on moving parts insuring higher sustained efficiency. Third, rapid disassembly plus maximum spare parts interchangeability between pump sizes assures reduced maintenance costs – less down time.



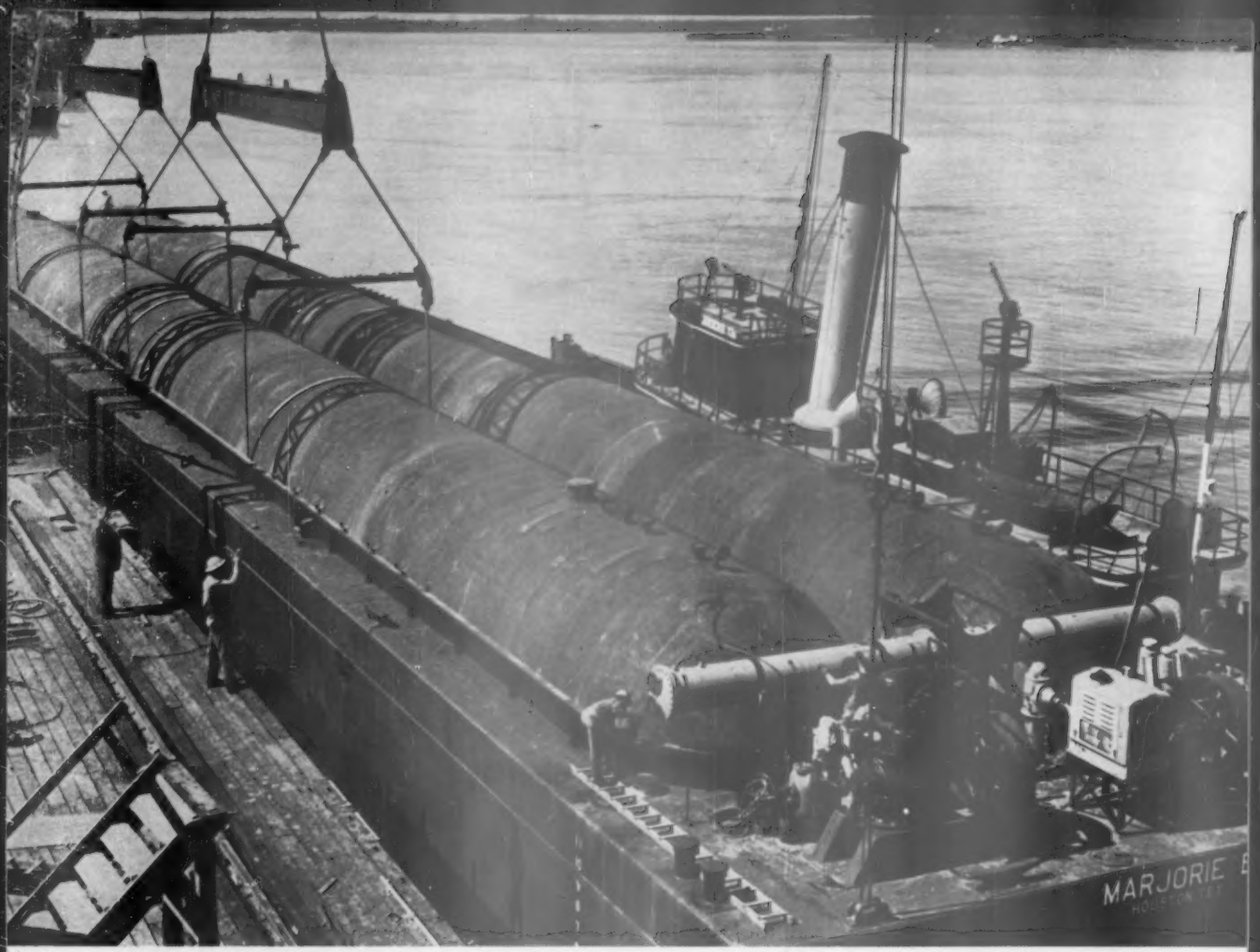
PACIFIC

CENTRIFUGAL PUMPS FOR PETROLEUM, CHEMICAL, UTILITY & GENERAL INDUSTRIES
OIL WELL PUMPS

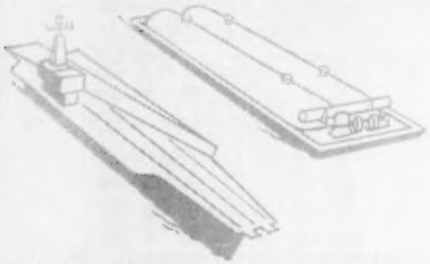
DRESSER INDUSTRIES INC.

OIL • GAS • CHEMICAL
ELECTRONIC • INDUSTRIAL

CP-26



Avondale 600-ton lift lowers 242' O.A. by 16' O.D. tank into position on Phillips Petroleum Company barge. This unit, one of two refrigerated propane-ammonia barges building for Phillips Petroleum, are the largest tank carriers yet to be constructed for the chemical or petrochemical industry for this type service. The heavily insulated tanks will carry 1700 tons of anhydrous ammonia, refrigerated to minus 28 degrees F., by equipment installed on the barge.



AVONDALE BARGES

SUPER CARRIERS WITH A DIFFERENT MISSION

This liquid chlorine carrier was built by Avondale for Monsanto Chemical Co. and measures 195' x 35' x 11'. It contains six tanks, each 8'8" O.D. x 70'0" in length. The capacity of this barge loaded is 900 tons of liquid chlorine.

Liquid chlorine is being transported by this 175' x 26' x 11' cargo barge for the Diamond Alkali Company. Four independent tanks were mounted on saddles and retained by adjustable 3" x ⅛" flatbar straps.

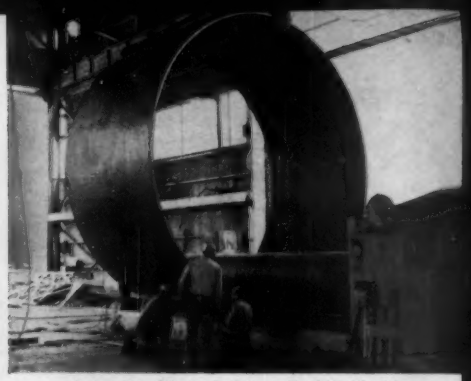
Hull of Phillips Petroleum barge ready for launching at Main Yard. Hopper design accepts two saddle-mounted tanks. The lead barge measures 305' x 44' x 12'6", the trailing barge 284' x 44' x 12'6". The pair are designed to be handled either independently or as an integrated tow.

Spread on these pages you will see a portion of the ever-increasing Avondale-built barge fleet—*carriers with a different mission.* They're big, they're specialized—they're *super* carriers—custom-built for the chemical and petrochemical industries.

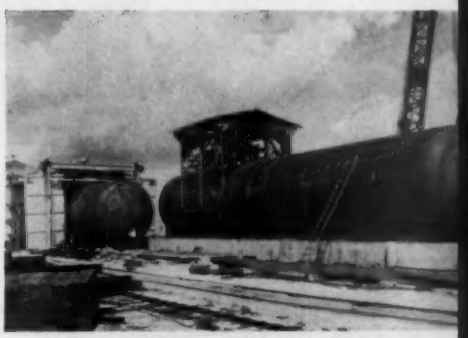
Avondale is admirably suited for complete responsibility in this type construction. Fabricating facilities include the largest and most progressive shipyard on the lower Mississippi, a complete foundry, and the finest technical know-how in the business.

Our best references include a long list of the most-respected names in the chemical and petrochemical industries.

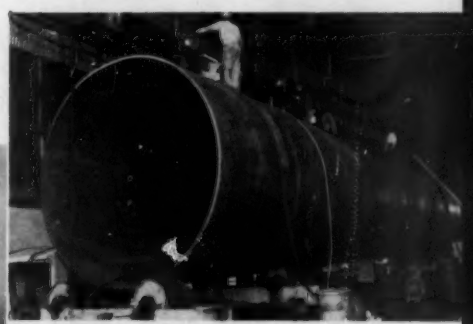
We would welcome the opportunity to quote *your* company in regard to its specialized barge requirements.



Largest cold steel plate roll of its kind in the Gulf South. This Bertsch roll in the Tank Shop has a capacity of 4½".

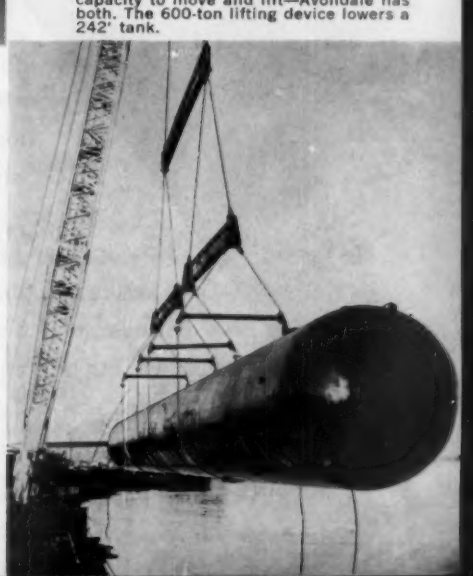


Specialized tank fabricating facilities. Foreground; tank nearing completion on aligning platten, left background; tank being stress relieved in Avondale 18' x 18' unlimited length stress-relieving furnace.

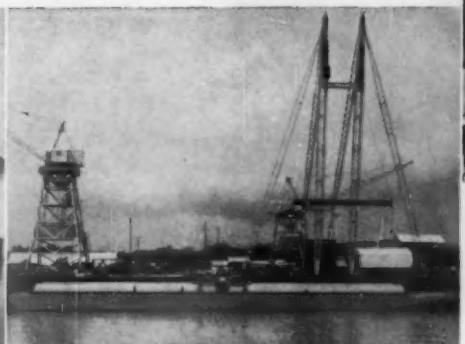


Tank and pressure vessel sections are welded together automatically on powered rolls in the Tank Shop.

Facilities to build, and facilities and capacity to move and lift—Avondale has both. The 600-ton lifting device lowers a 242' tank.



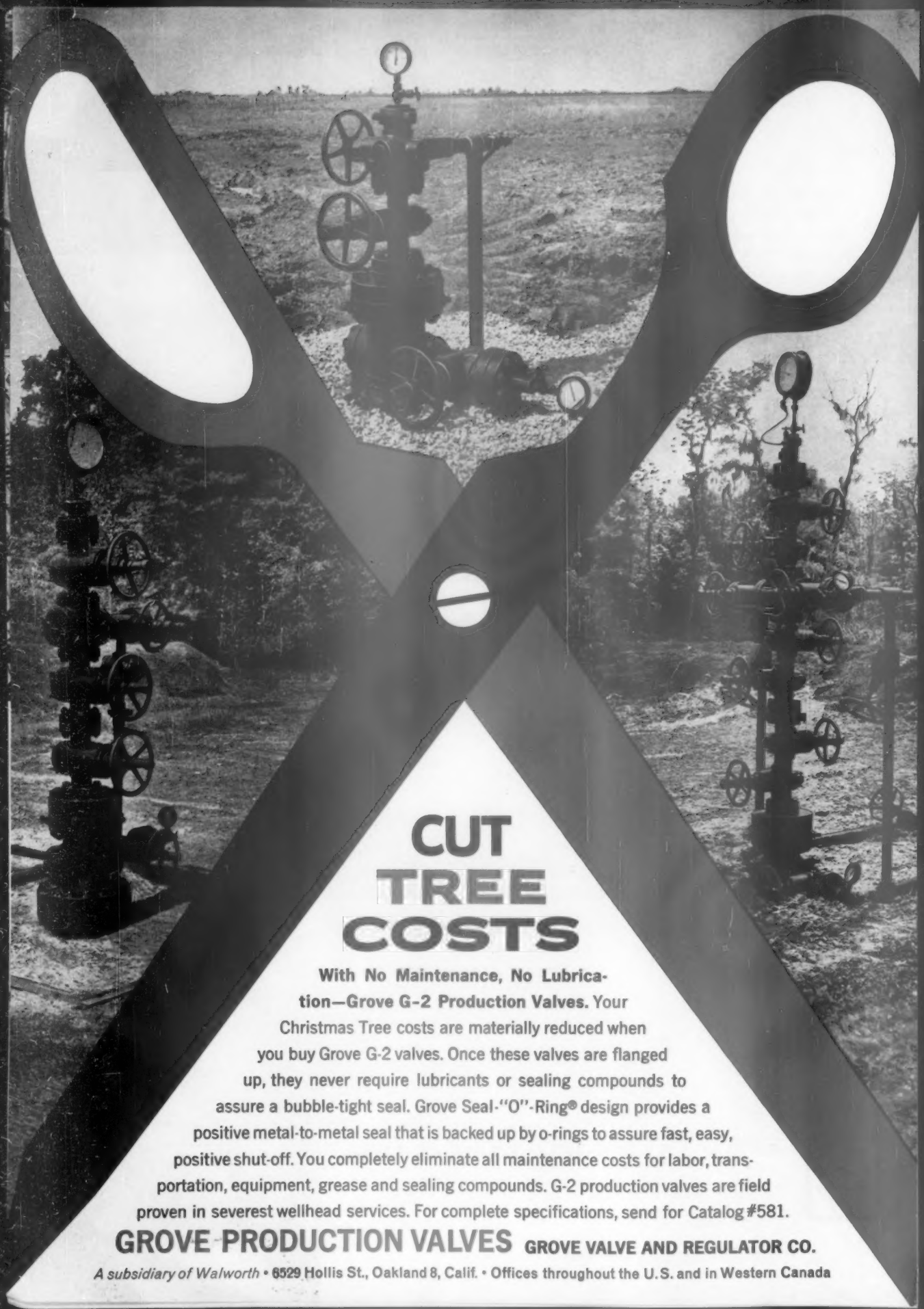
In service for a chemical transporting company. Liquid caustic soda tank barge. Capacity 1682 tons. Size: 205' x 40' x 11'.



One of two independent pressure tank barges completed for Union Texas Natural Gas Corporation. Each barge measures 273' x 41' x 12'6". Each barge contains four cargo tanks 112' in length, each tank with a capacity of 165,000 gallons, for a total barge capacity of 660,000 gallons.

AVONDALE SHIPYARDS, INC.

P. O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U.S.A.



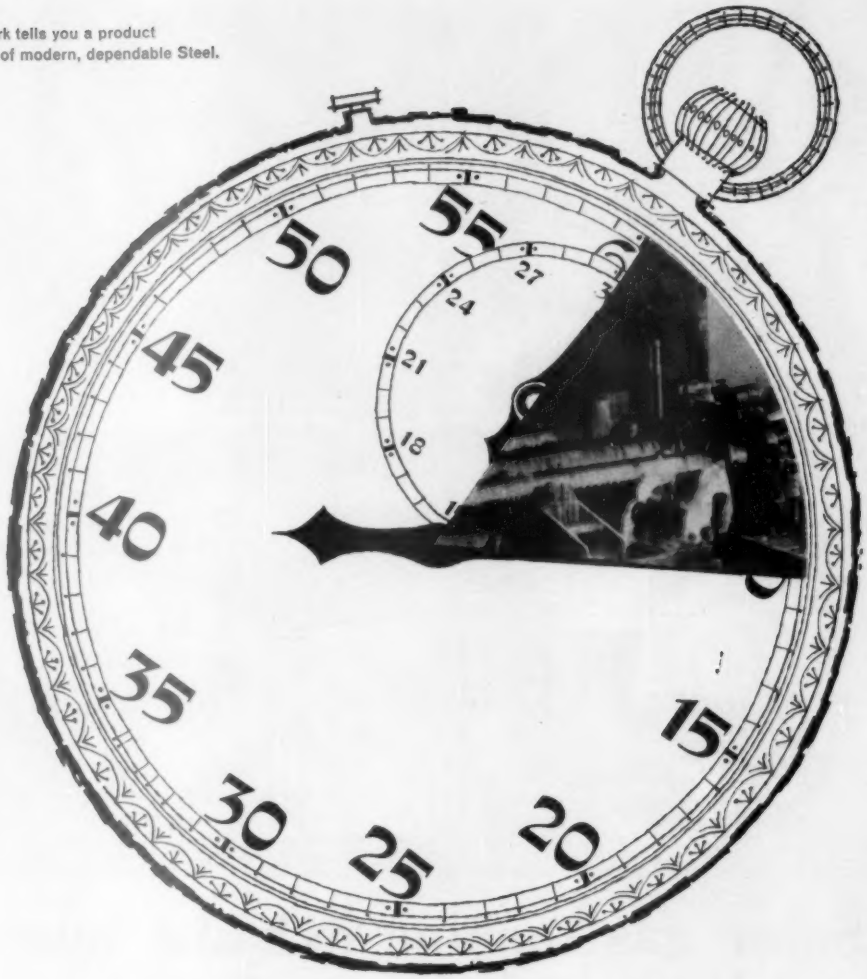
CUT TREE COSTS

With No Maintenance, No Lubrication—Grove G-2 Production Valves. Your Christmas Tree costs are materially reduced when you buy Grove G-2 valves. Once these valves are flanged up, they never require lubricants or sealing compounds to assure a bubble-tight seal. Grove Seal-"O"-Ring® design provides a positive metal-to-metal seal that is backed up by o-rings to assure fast, easy, positive shut-off. You completely eliminate all maintenance costs for labor, transportation, equipment, grease and sealing compounds. G-2 production valves are field proven in severest wellhead services. For complete specifications, send for Catalog #581.

GROVE PRODUCTION VALVES **GROVE VALVE AND REGULATOR CO.**

A subsidiary of Walworth • 6529 Hollis St., Oakland 8, Calif. • Offices throughout the U.S. and in Western Canada

This mark tells you a product is made of modern, dependable Steel.



The ten most important seconds in the life of a pressure tube

Every length of USS National Electric-Resistance Welded Pressure Tube must pass a hydrostatic pressure test before it leaves our mill.

Each tube is fitted in leakproof heads and filled with water treated with a corrosion inhibitor. After all air is purged, pressure is applied and held for ten seconds. Internal hydrostatic pressure varies with size as prescribed by applicable ASTM specifications which are designed to produce a wall stress from 16,000 to 24,000 psi. Typical pressures so calculated are 4,000 psi for 1″ O.D. x .085″ wall and 2,100 psi for 3″ O.D. x .134″ wall.

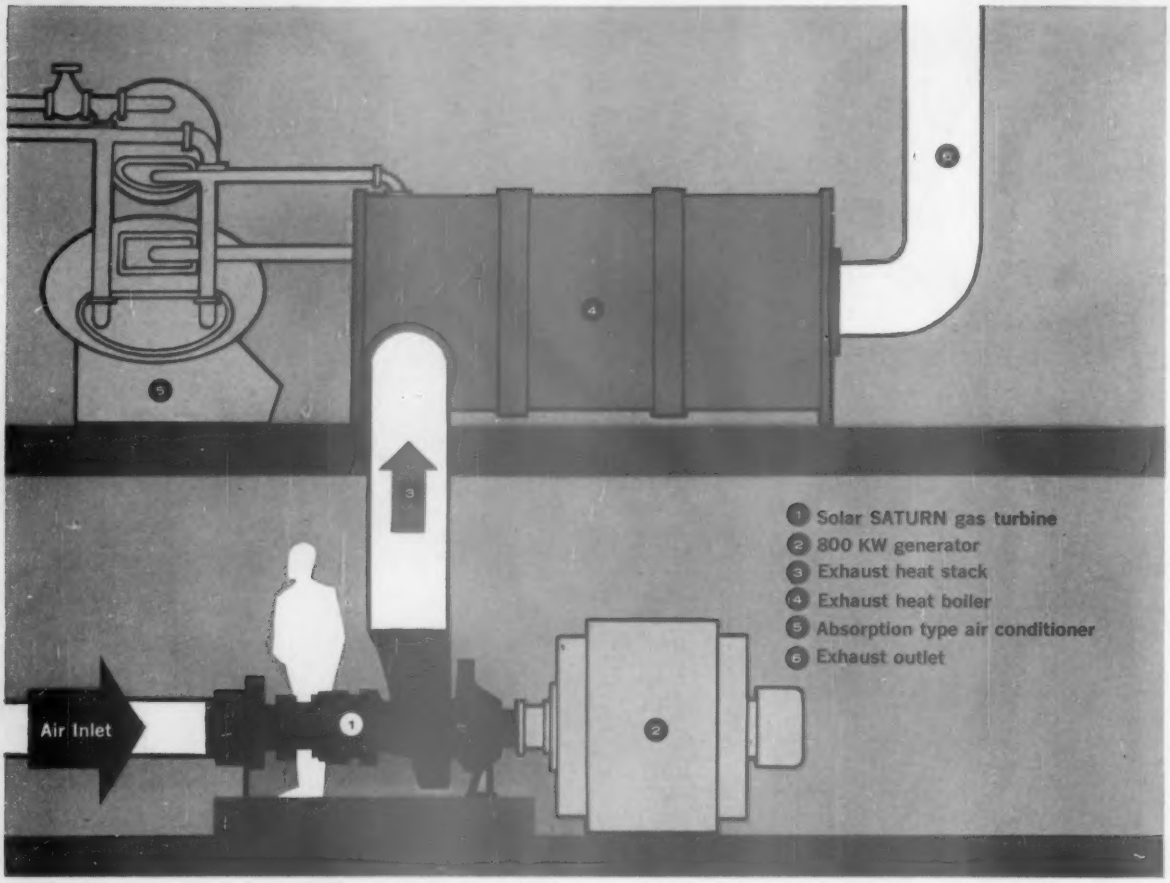
Our rigid inspection of each pressure tube promises long efficient service in boilers, heat exchangers, condensers, super-heaters, economizers and other pressure applications.

For your next installation, consider USS National Electric-Welded Pressure Tubes. They are stocked all over the country by National Tube Distributors. Our trained Mill Service Force is also available for field consultation. Write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and National are registered trademarks

USS **National Tube Division of United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • United States Steel Supply Division • United States Steel Export Company, New York



Solar gas turbine exhaust heat multiplies thermal efficiency

This unique system of efficient exhaust energy utilization illustrates one of the many advantages of Solar gas turbines. In addition to the turbine's main shaft power, exhaust gases can be put to work to multiply the thermal efficiency of the installation up to three times that of the prime mover alone.

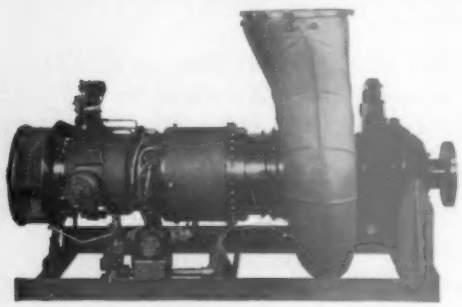
In the typical system illustrated above, Solar *Saturn* gas turbines turn 800 kw generators, providing electricity for lighting and machinery. Turbine exhaust heat is passed through a boiler to provide steam for process or building heat and absorption air conditioning.

This installation with three *Saturn* engines produces 2400 kw of electrical energy and 16,150 lbs of steam per hour. The complete package fits in a 60 ft by 40 ft space. The turbines will run on gasoline, kerosene, diesel fuel and natural or manufactured gas.

Exhaust heat utilization systems are easily adaptable to any job where electric power generation is needed, such as manufacturing and processing plants.

Solar gas turbines with their light weight, compactness, lack of vibration, long life and instant start capabilities are ideally suited for such jobs as electrical power generation, pumping, field and pipeline compression, oil well servicing, vehicle or marine propulsion.

Solar's family of gas turbines, from 50 to 1100 hp, are designed specifically for industrial use. Their design and manufacture are the result of over 15 years of experience. For further information, write to Dept. J-142, Solar Aircraft Company, San Diego 12, California.



SOLAR

A subsidiary of International Harvester Company

PORTRAIT OF DEPENDABILITY

Undisturbed cobwebs tell a powerful story! Day in and day out, OIC steel valves take strain, vibration, pressure changes and shock in their stride. From the outside you get no hint of the precise manufacturing tolerances that make this trouble-free performance possible. OIC steel valves are designed to handle your steam, chemicals or hydrocarbons with minimum maintenance and maximum cost savings. Of this you can be sure . . . OIC steel valves are built to operate with complete dependability.

THE FINEST VALVES AND DISTRIBUTOR SERVICE FROM OIC

OIC VALVES

BRONZE, IRON,
FORGED STEEL,
CAST STEEL AND
DUCTILE IRON VALVES

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

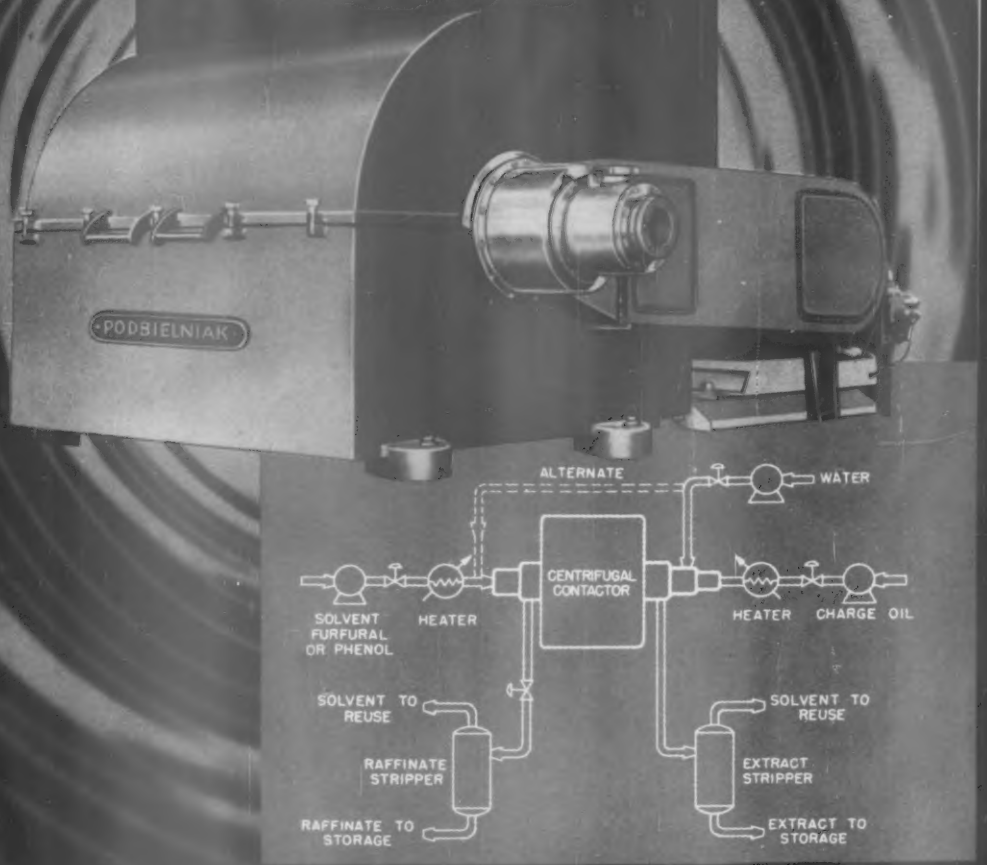
The Ohio Injector Company
273 Main Street, Wadsworth, Ohio.

10818-OIC

Your story interests me. Please send more information about valves used in my industry.

Name _____
Company _____
Product _____
Street _____
City _____ Zone ___ State _____

"TOWERLESS" REFINING YIELDS BIGGER PROFITS



TECHNICAL CATALOG:

Write for copy of illustrated catalog which tells the interesting story of the Podbielniak centrifugal contactors.

Dresser-Podbielniak Centrifugal Contactor Permits Lower Costs, Increased Efficiency

A COMPACT PODBIELNIAK CENTRIFUGAL CONTACTOR can replace a conventional gravity tower a hundred feet high and eight feet in diameter, with comparable capacity, greater efficiency, more versatility and increased ease of operation. Using up to 2000 times the force of gravity, Podbielniak contactors effect controlled mixing and phase separation as required in countercurrent multistage solvent extraction processes.

COMPACTNESS OF THE UNIT results in a 95 per cent reduction of solvent inventory and material in process. Almost instantaneous response to control allows rapid switching of feed stocks to permit "on-spec" production soon after changeover.

INSTALLATION OF A PODBIELNIAK equipped furfural extraction plant costs only one-third of additional cracking facilities required to obtain the same increase in virgin charge capacity. A wide range of Podbielniak extractors is available, with rotors up to 48 inches in diameter by 60 inches wide, handling 600 gallons per minute combined flows for gas oil-solvent application.

THE ADDITION OF PODBIELNIAK to its team allows Dresser Industries to offer even greater service to the petroleum industry. The centrifugal contactor developed and manufactured by Podbielniak, newest of the Dresser companies, provides refinery operators substantially reduced costs, improved product quality, new marketable products, and increased profits.

TYPICAL PROFIT-MAKING APPLICATIONS OF THE PODBIELNIAK CENTRIFUGAL CONTACTOR:

- ★ Extracting aromatics from distillates, kerosene, jet fuel, etc., with liquid sulfur dioxide solvent.
- ★ Continuous separation of salt water from crude oils.
- ★ Extracting and purifying butadiene with CAA (cuprous ammonium acetate) solvent.
- ★ Sweetening of gasoline by continuous stream treating with caustic-cresol and other reagents.
- ★ Extracting undesirables (sludge forming aromatics and other unstable compounds) from lube oils to improve viscosity index while at the same time maintaining high yields, using solvents such as phenol, furfural, liquid sulfur dioxide, nitrobenzene and others.
- ★ Dewaxing and deasphalting of lube oil stocks.
- ★ Producing white oil and detergent additives for motor oils by continuous oleum reaction, followed by caustic neutralization and solvent extraction.
- ★ Removing sulfur compounds from catalytic cycle stock by means of continuous acid treating.
- ★ Water washing crude oils to remove corrosive salts prior to distillation.
- ★ Removal of phenols from waste waters using benzol and other solvents.
- ★ Recovering oils from tanker ballast while at the same time preventing harbor pollution.
- ★ Extracting aromatics from light cycle stock for the production of naphthalene.
- ★ Eliminating poisoning of reformer catalyst by removing impurities from naphtha charge stock.
- ★ Continuous acid treating of lube and specialty oils to improve oxidation stability, color, and decrease sludging tendencies, by eliminating impurities not removable by other solvent extraction processes.
- ★ Extracting aromatics from cycle stock to increase cat cracker capacity, cat gasoline yield and poly-gasoline production while at the same time reducing coke burning requirements and cat cracker investment.

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Olean, New York
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• Gas Turbines

PACIFIC

PACIFIC PUMPS, INC.
5715 Bickett Street
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Podbielniak, Inc.

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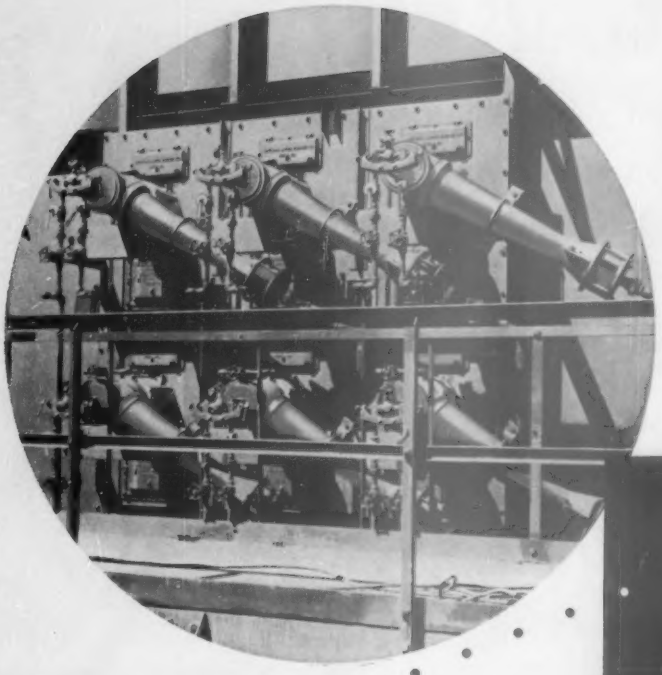
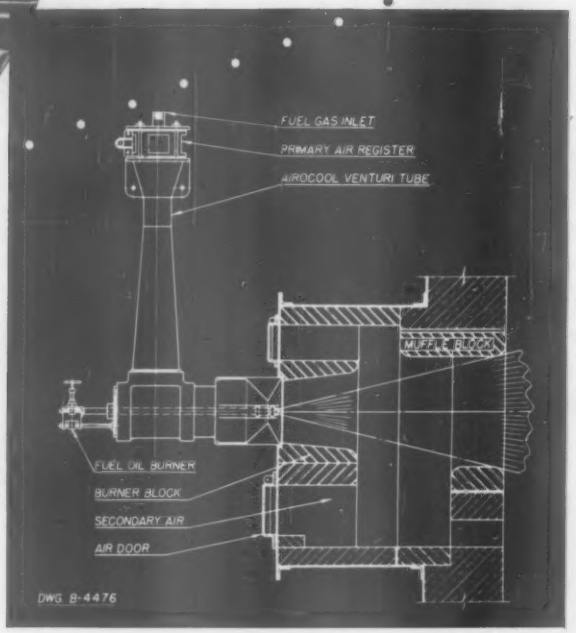
• PODBIELNIAK JOINS CLARK, PACIFIC AND ROOTS-CONNERSVILLE AS THE NEWEST MEMBER OF THE DRESSER TEAM SERVING THE REFINING INDUSTRY. •



NATIONAL AIROIL OIL-GAS TANDEM COMBUSTION UNITS



Fire World's Highest Thruput Crude Distillation Unit

At Tidewater Oil Company's modern Delaware Refinery, this huge crude furnace now has the world's record capacity of 150,000 barrels per day. It is equipped with National Airoil Burner Company's exclusive Tandem Block Combustion Units . . . easily capable of exceeding the designed capacity of the furnace when burning either liquid or gaseous fuels.

These Tandem Units will burn up to high viscosity residuum oils and/or varying molecular weights of refinery gases. They have high individual heat liberating capacity as well as turn down ratio on natural draft thus avoiding the cost of a blower system. They will operate with low excess air.

Because these high combustion efficiency Tandem Units liberate a large proportion of heat by flame radiation to the heat absorbing surfaces, they increase the days on stream by reducing flame impingement with its accompanying high maintenance cost to tubes, brick work, etc.

NATIONAL AIROIL BURNER

Established 1912
Incorporated 1917

NATIONAL AIROIL BURNER COMPANY, INC.
1284 E. Sedgley Avenue • Philadelphia 34, Pa., U.S.A.
Industrial Oil Burners, Gas Burners and Combustion Equipment

PUMPS PLAY KEY ROLE IN THIS UNUSUAL SKID MOUNTED GASOLINE PLANT

Peerless pumps circulate, boost, transfer and load finished product at Cheney Gasoline Plant...

When the Cheney Gasoline Plant of Kansas Hydrocarbons went on stream, it marked a new innovation in plant construction. The entire facility, built by Stearns-Roger was constructed and preassembled in their Denver shops. All equipment, except for a few process auxiliaries were skid mounted, then trucked to the job site for final installation.

The plant, built to process propane, butane and RVP gasoline, employs a wide variety of Peerless pumps to keep a smooth, steady process flow. For example, a Type DM pump is in fractionator reflux service. Another Type DM serves as a hot oil pump. There is a two stage Type TPRS pump handling lean oil and propane. The cooling tower has a Peerless Type A pump circulating 1800 gpm for process cooling. And two Peerless Hydro-Line models are handling the product loading function.

Just as they are getting the job done in the Cheney Gasoline Plant, Peerless pumps can perform a key role in your plant or process.

Dependable operation, quality construction, maximum parts interchangeability are but a few of their many features. Get more facts now. Write us today for catalog and name of the Peerless representative in your area.

Putting Ideas to Work

PEERLESS PUMP

HYDRODYNAMICS DIVISION

Plants: Los Angeles 31 California, and Indianapolis 8, Indiana.

Offices: New York; Detroit; Chicago; Cleveland; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno.

Distributors in principal cities. Consult your telephone directory.

PEERLESS TYPE DM • PEERLESS TYPE PRS • PEERLESS TYPE A • PEERLESS HYDROLINE

CHENEY GASOLINE PLANT OF KANSAS HYDROCARBONS, NEAR WICHITA, KANSAS

Here Your Motor Starter Dollar Buys

MORE OF THE QUALITIES YOU NEED

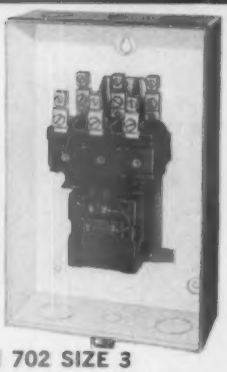
BULLETIN 709 SIZE 3
across-the-line solenoid starter in Nema Type 1 enclosure.

Where else could you possibly obtain—in one complete line—all of the desirable features of the ideal motor control...

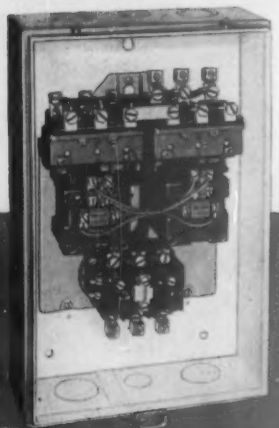
1. Smaller size
2. Greater reliability
3. Remarkable switching capacity
4. Longer life
5. Conscientious overload protection
6. Simpler installation
7. Complete accessibility
8. Beautiful appearance—either open or enclosed
9. Surprising light weight

The heart of this new line of magnetic motor starters is the unique solenoid contactor. While it retains the famous A-B one-moving-part principle, it is completely new and far more efficient. This fact is reflected in reduced dimensions for all of these controls. Yet, this contactor design will perform reliably for many more *millions* of trouble free operations.

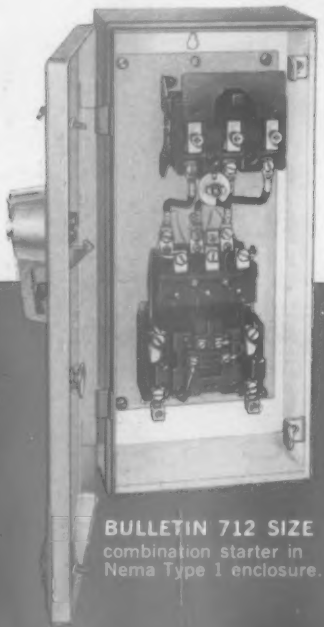
The new enclosures are very "eye appealing." When the open type starters are assembled into special panels, their neatness and compactness will delight the designers. Full details are in Publication 6100. Please write: Allen-Bradley Co., 1304 S. Second St., Milwaukee 4, Wis.



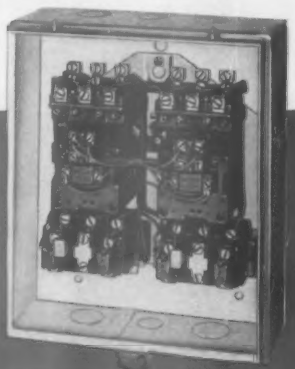
BULLETIN 702 SIZE 3
three-pole, a-c solenoid contactor in Nema Type 1 enclosure.



BULLETIN 705 SIZE 2
across-the-line reversing starter and overload relays in Nema Type 1 enclosure.



BULLETIN 712 SIZE 2
combination starter in Nema Type 1 enclosure.



BULLETIN 715 SIZE 1
across-the-line, two-speed starter—with two overload relays per speed—in Nema Type 1 enclosure.

ALLEN-BRADLEY
Member of NEMA

QUALITY
MOTOR CONTROL

"Businessmen are too often antagonistic to government. And some in government have found it politically useful to harass business. We could do with a lot more understanding and a lot more realism on both sides." *–M. J. Rathbone, President*

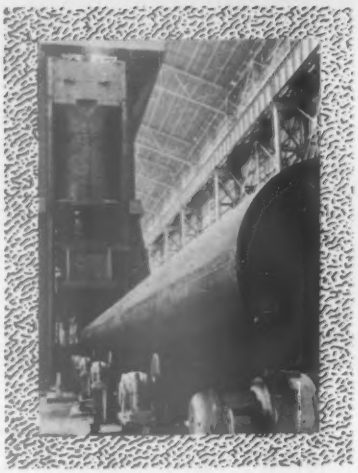
ESSO

Standard Oil Company (New Jersey)

(WHOSE PRINCIPAL U. S. OPERATING AFFILIATE IS HUMBLE OIL & REFINING COMPANY)

NKK MEANS REALLY SUPERIOR LINE PIPE

The highest quality line pipe is a major product of our completely integrated production line. Our High-Pressure Line Pipe is produced in accordance with API standard 5LX at NKK's new Large Diameter Welded Pipe Mills — the only installation of its kind in the Orient. It is a superb product of the U.O.E. Process. This high-yield strength pipe is made by the Automatic Submerged Arc-Welding and Hydraulic Cold-Expanding System . . . For a really superior line pipe you're invited to take advantage of NKK's 50 years of experience as Japan's leading steel maker. Write for details & catalogs.

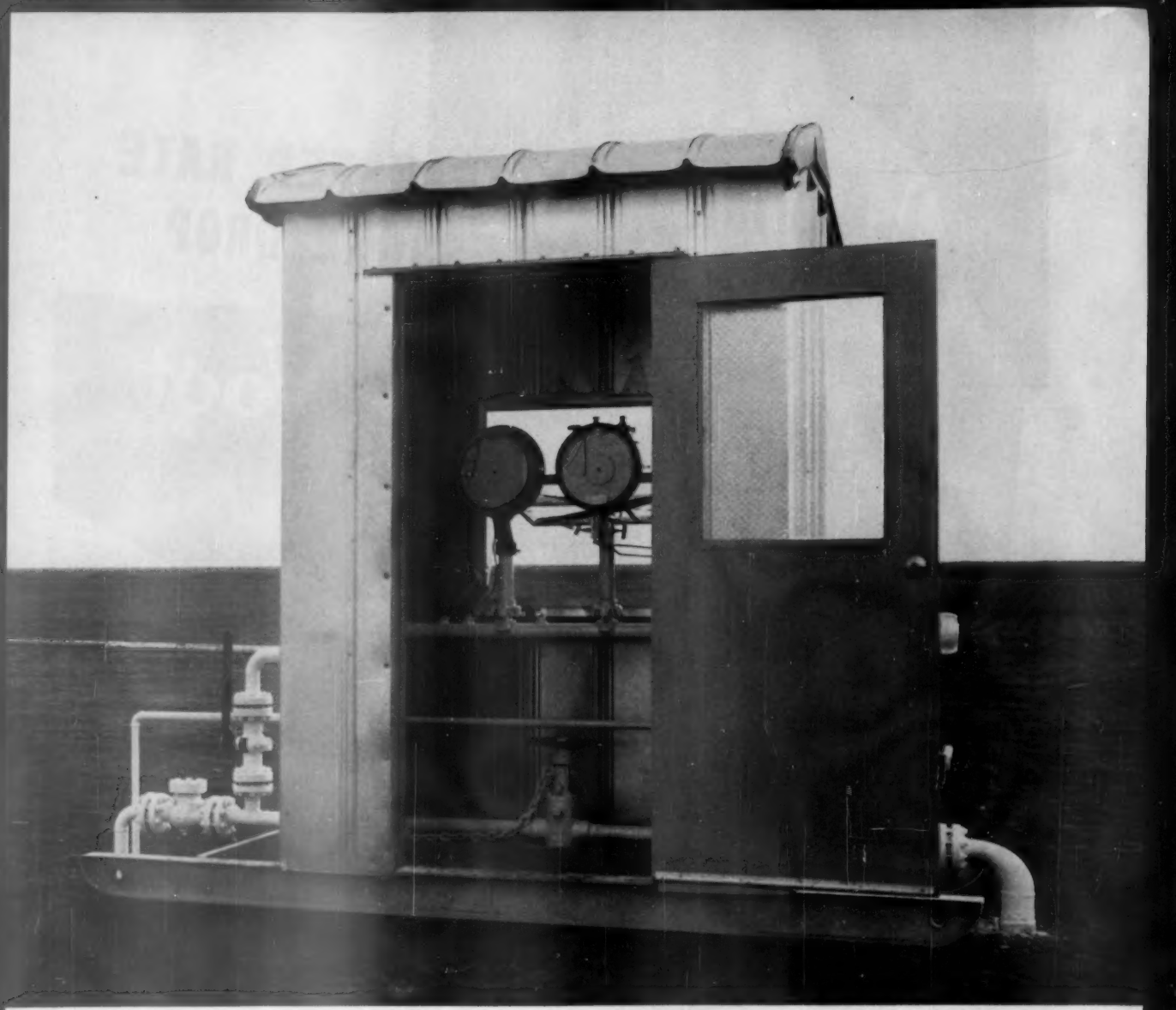


NKK

NIPPON KOKAN K.K.

(Japan Steel & Tube Corporation)

HEAD OFFICE: Otemachi, Chiyoda-ku, Tokyo, Japan
NEW YORK OFFICE: Rm. 1115, 39 Broadway, New York 6, N.Y., U.S.A.
EUROPEAN OFFICE: Kreuzstrasse 34 11, Düsseldorf, West Germany
SINGAPORE OFFICE: Rm. 414, Shaw House, Orchard Road, Singapore



Transwestern Pipeline Company uses Foxboro T/37 "dry" meter and temperature recorder to log gas purchased from Parsell Field, Texas, well.

wet gas, line surges, the weather... nothing upsets Foxboro "dry" flow meters

All Foxboro T/37 Meters have specially-formed diaphragm discs with solid metal spacer rings. Diaphragm assembly can't be damaged by overrange, line surges, or winter freeze-ups.

You'll find Foxboro T/37 Flow Meters on gas wells and gathering lines all over the Texas Panhandle... including many of those owned by Transwestern Pipeline Company—America's newest supplier of natural gas.

Since Panhandle gas normally contains a high amount of liquid hydrocarbons, the T/37 is a "natural." There is no mercury to clean or replace. Maintenance is kept to a minimum. In addition the T/37 is completely free from zero drift and ambient temperature effects... resulting in the highest sustained accuracy of gas flow measurement.

No wonder both pipeliners and producers are high in their praise for the Foxboro T/37. Mercury-less—accurate—almost indestructible, it's the flow meter that's setting new standards for gas measurement. Ask your Foxboro Field Engineer for complete details. Or write for Bulletin 7-15. The Foxboro Company, 669 Neponset Ave., Foxboro, Massachusetts.

FOXBORO

REG. U.S. PAT. OFF.

NOW HIGH HEAT TRANSFER RATE with LOW PRESSURE DROP

Another Vogt Engineering Achievement

*One of the many distributor types developed for various applications.**

**Covered by Pat Nos. 2,057,597, 2,424,441 and others pending.*

TOP: *Muddy well water is the coolant for these Jacket Water Coolers.*

RIGHT: *Two 56" Dia. x 12'0" high Amine Solution Coolers with expansion joints in shell.*

BOTTOM: *One of a number of seawater cycle units for a chemical plant. Nylon distributing ferrules prevent adherence of barnacles. Low pressure drop allows circulation of large quantity of seawater.*

Special metering distributors control the flow in vertical Vogt film type exchangers of single tube-pass design. The liquid is spread in a uniform film over the inside surface of the tubes. Since the liquid falls by gravity, good velocity is obtained with a small quantity of liquid.

Vogt has developed many types of distributors which are made from a variety of materials to accommodate the fluids circulated through the tubes in specific processing operations.

A unique feature of these exchangers is that the tube side can be cleaned while in operation.

Vogt Film Type Exchangers are used as Coolers, Condensers, Absorbers, Heaters, and Evaporators.

Other Vogt Products

Forged Steel Valves and Fittings. Petroleum Refinery and Chemical Plant Equipment. Steam Generators. Heat Exchangers. Ice Making & Refrigerating Equipment.

BULLETIN HE-8

Bulletin HE-8 describes unusual and standard Vogt Heat Transfer Equipment and is available upon request. Address Dept. 24A-XO.

For Direct Long Distance to Louisville Dial: 502 [illegible]

HENRY VOGT MACHINE CO.
Louisville, Ky.

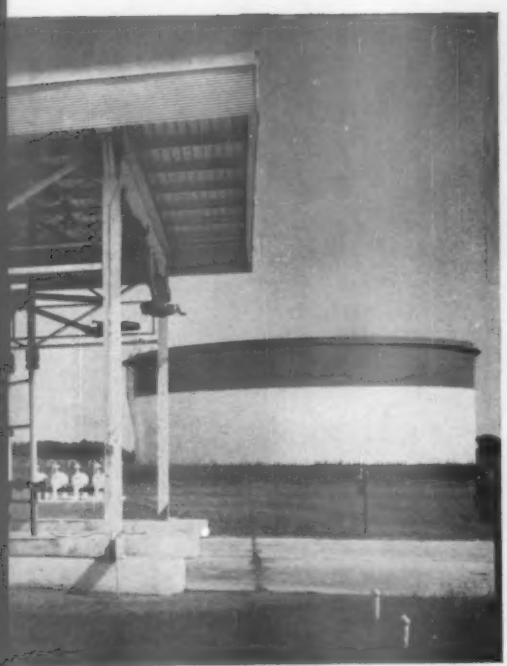
SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati, Los Angeles

Vogt FILM-TYPE HEAT EXCHANGERS

ASSURANCE

of unsurpassed performance at terminals with

CB&I Floating Roof Tanks



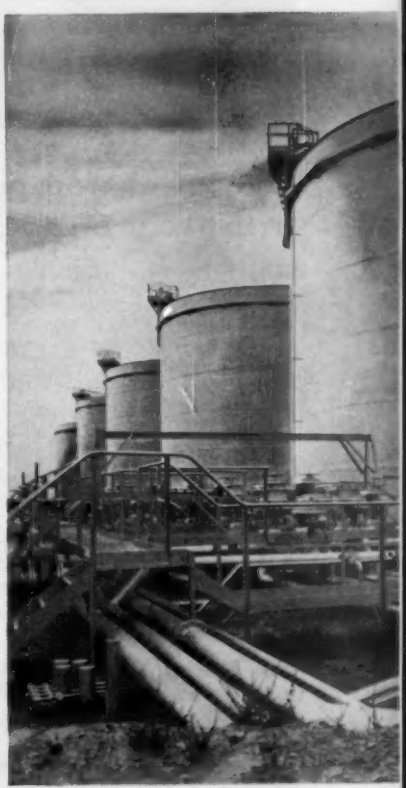
Superior design, construction and performance repeat again and again as the reasons why CB&I floating roof tanks are being installed at terminals throughout the world in ever-increasing numbers each year.

Performance is superior in two ways: First, in reducing evaporation loss, retarding corrosion and minimizing fire hazards. Second, in smooth, trouble-free operation, particularly when throughput is high.

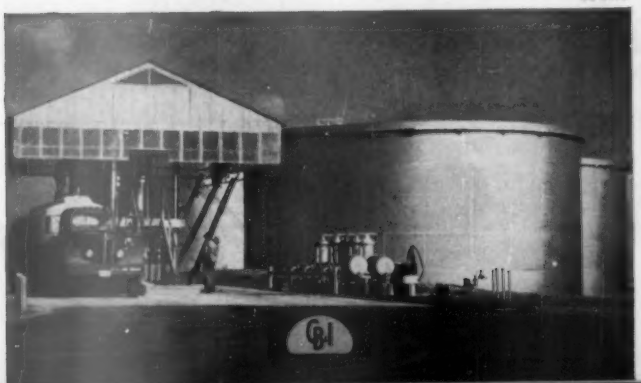
CB&I offers the widest choice of Horton seals, including:

SR3—Metallic Seal
SR5—Liquid Filled Fabric Seal
SR6—Inflated Fabric Seal
SR7—Resilient Foam Fabric Seal

Write for Brochure B, "Floating Roof Tanks." Chicago Bridge & Iron Company, 332 S. Michigan Avenue, Chicago 4, Illinois. Offices and subsidiaries throughout the world.



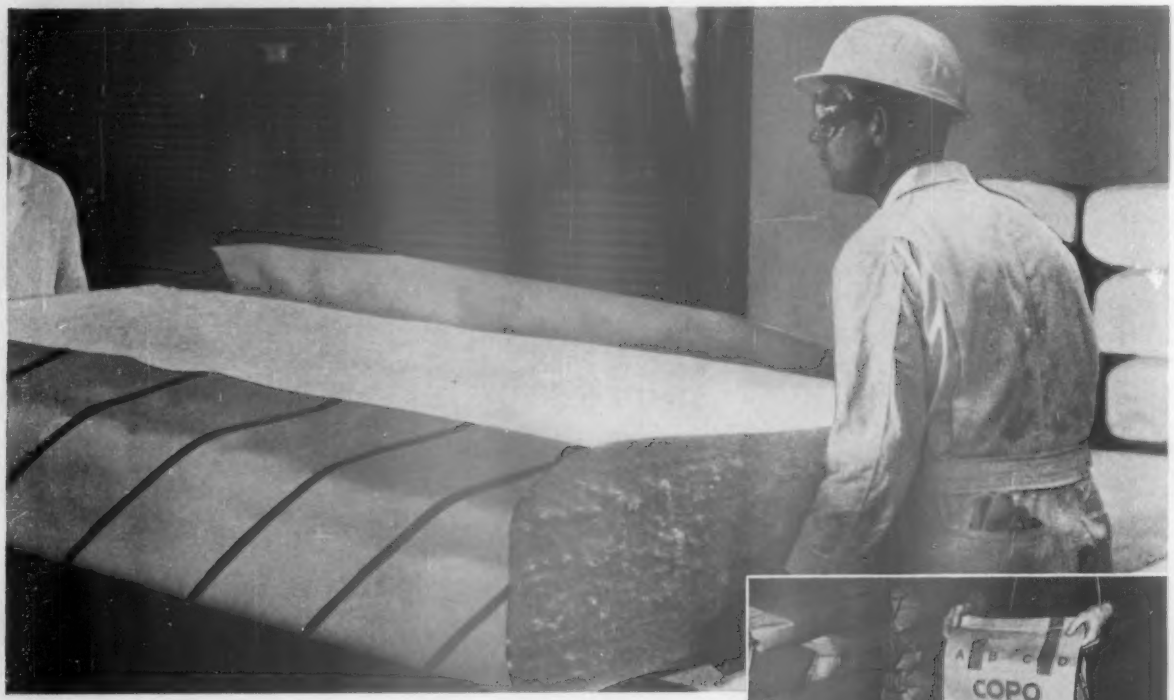
CB-6115



CB&I

SILICONE NEWS from Dow Corning

Stop sticking / start saving



Syl-off coated papers speed unpacking, simplify handling of sticky products

Recognize this problem? The product sticks. So does production. Handling costs go up. Lost time and product waste run high. If this is a problem to you, it needn't be.

Here's a solution. Specify packaging and processing papers coated with a Syl-off® silicone release coating. Even the toughest stickers—asphalt, adhesives, dried fruit, plastic bases, polyurethane, raw rubber—come away cleanly and quickly from all types of containers and process papers coated with Syl-off. Nonmigrating and noncontaminating, these anti-adhesive silicone coatings aid processors in removing all the product, keep production moving smoothly, and hold product waste to a minimum.

More uses. Pressure-sensitive decals, labels, decorative trims and wallpapers peel free in a flash from Syl-off coated separators — no tearing or shredding. Pan liners and wrappers coated with food grade Syl-off coatings are used in contact with sticky baked goods and other foods in compliance with provisions of the Food Additives Amendment of 1958.

You benefit. Whether you buy, ship, or handle sticky products during your process operations, there's a Syl-off coated paper to solve your sticking problems . . . produce extra profits. Investigate now.

For detailed data plus a list of sources of Syl-off coated papers, write Dow Corning Corporation, Dept. 8821, Midland, Mich.

first in silicones

Dow Corning

YOU CAN DEPEND ON

Darling

Darling aluminum gate valves resist corrosive attack from chemicals such as hydrogen peroxide, ammonium nitrite, acetic acid and concentrated nitric acid. In such services *you can depend on Darling* aluminum gate valves to last longer, cut maintenance costs.

Darling metallurgists tested—then standardized—on aluminum alloys that provide maximum strength and corrosion resistance. Rigid quality control and precision assembly assure continuous ease of operation. The exclusive revolving double disc parallel seat feature means freedom from leakage and assures long service life.

Darling aluminum gate valves are available in sizes from ½" through 24". We will be glad to make recommendations.

SPECIAL ENGINEERING SERVICE. Darling engineers are ready to work with you in designing special valves to meet unusual service requirements. Write, wire or phone for prompt action.

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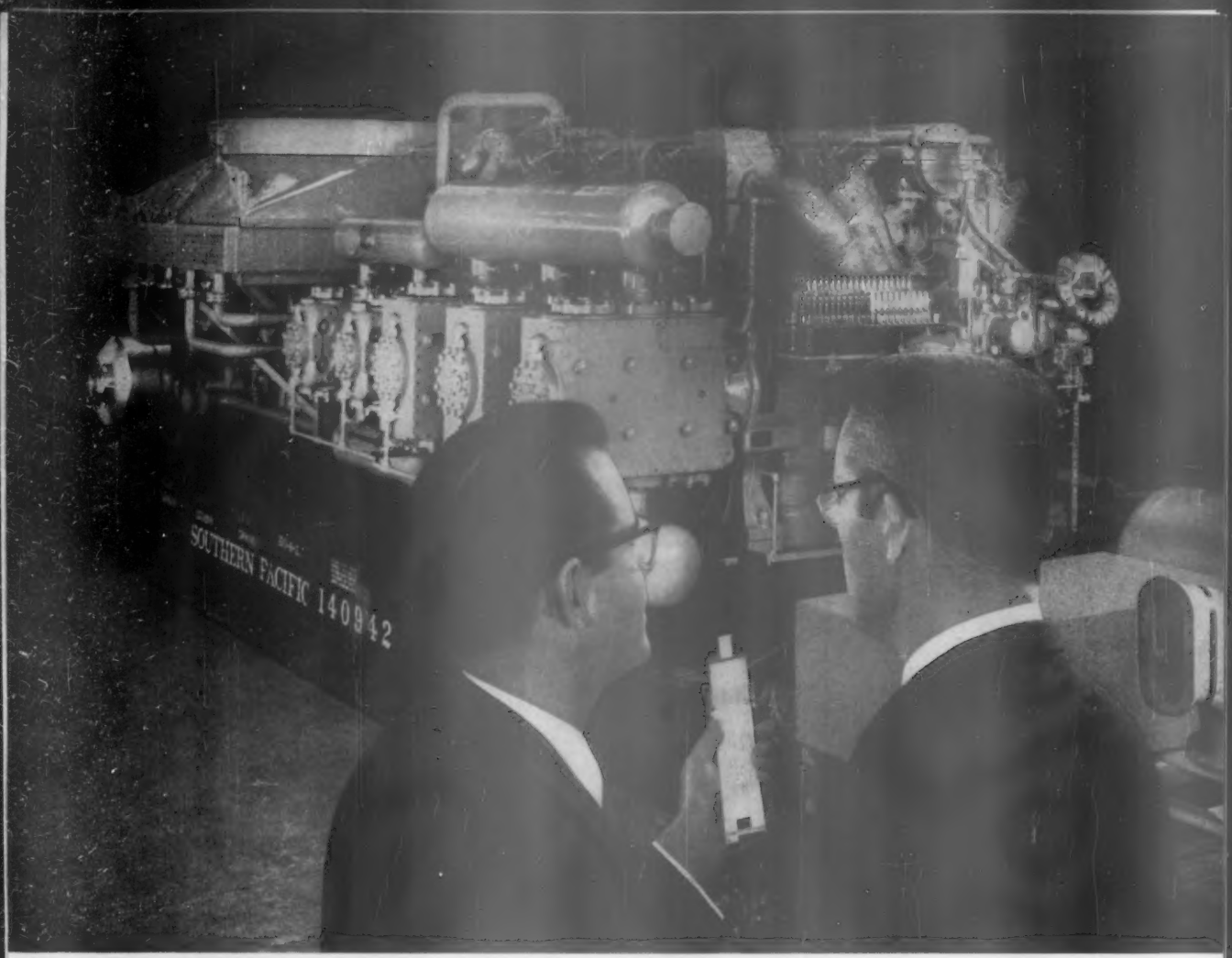
DARLING VALVE & MANUFACTURING COMPANY

Williamsport 1, Pa.

Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario, Canada
Vannes Darling-France, 23 rue du Commandant Mouchotte, St. Mandé, France

GATE • BUTTERFLY • CHECK • SPECIAL VALVES • FIRE HYDRANTS



How C-B/S Compressor Designs Solve Your Problems in Gas Gathering

Whether your problem revolves around fine compressor balance for barge-mounted operations, remote control or split gas streams, C-B/Southern people understand your needs. Their application experience is coupled with actual oil and gas producing background. That is why they can provide you with on-the-spot suggestions to economically solve your toughest gas gathering problem. This background is enhanced by company knowledge gained in building more than 40,000 compressor horsepower last year.

C-B/Southern's experience extends through Design, Engineering and Manufacturing Departments. It reaches all the way to future service from 22 Cooper-Bessemer service offices.

A point worth remembering: C-B/S packaged compressor plants are available in horsepower ratings from 100 to 1440; unitized compressors, both reciprocating and centrifugal, to 10,500 horsepower.

CB/S

PACKAGED COMPRESSORS

CB/S

C-B/Southern, P. O. Box 19267, Houston 24, Texas · HOmestead 8-5441

A division of The Cooper-Bessemer Corporation

MANUFACTURERS OF PACKAGED COMPRESSOR PLANTS FOR GAS GATHERING, GAS LIFT, GAS INJECTION APPLICATIONS

TRAPPED ?

Tired - - - Tense - - - Trapped in a tangle of tension because of mounting inventory costs? Delivery deadlines? Don't reach for the tranquilizers - - - Let McCormick, with service centers near you, take the guess-work out of these problems. Call a McCormick man today - - - there's a plant near you.

McCORMICK Steel Company

Steel and Aluminum Service Centers

HOUSTON • DALLAS • CORPUS CHRISTI • LUBBOCK • OKLAHOMA CITY

THREE | GREAT | SERIES

A MARSH Valve for every purpose

Yes, three great series of needle throttling valves. Great in design and construction. Great in range of corrosion resistant service. Great in range of sizes and patterns.

All three series share the basic design and construction that has set new standards for Marsh Needle Valves.

All give smooth, close regulation and positive shut-off from a few pounds pressure up to high pressures.

All have body and stem guides machined from solid bar stock to provide extra strength and valve life.

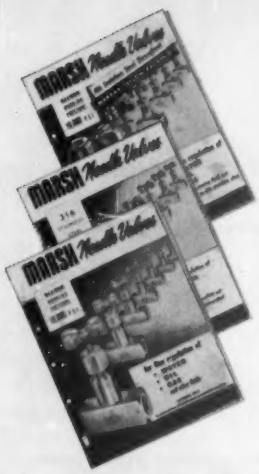
All have precision ground stems and long fine-pitched accurately-machined stem threads for micrometer regulation and tight shut-off.

All have deep inlet and outlet threads for tight make-up.

All have special, long-lasting, readily-replaced, special "Marpak" packing incorporating all-but-indestructible Teflon in the stainless steel series.

You see a globe valve representing each series here. Note that the color of the handle identifies the series. Valves come to you individually sealed in strong, transparent plastic packages. In appearance, in operation, in service life you have in these valves the kind of product that only Marsh experience in *both* valve making *and* instrument making could produce.

Globe and angle valves in all three series are available with double female connections in sizes ⅛", ¼", ⅜", ½", ¾" and 1"—with male inlet and female outlet in sizes ¼" and ½". Panel mounted types in all sizes. Write for bulletins.



Ask for bulletins

These three bulletins, covering alloy steel, 416 stainless steel, and 316 stainless steel valves will be sent to you in a binder. Write.

In stock at your nearest Supply House

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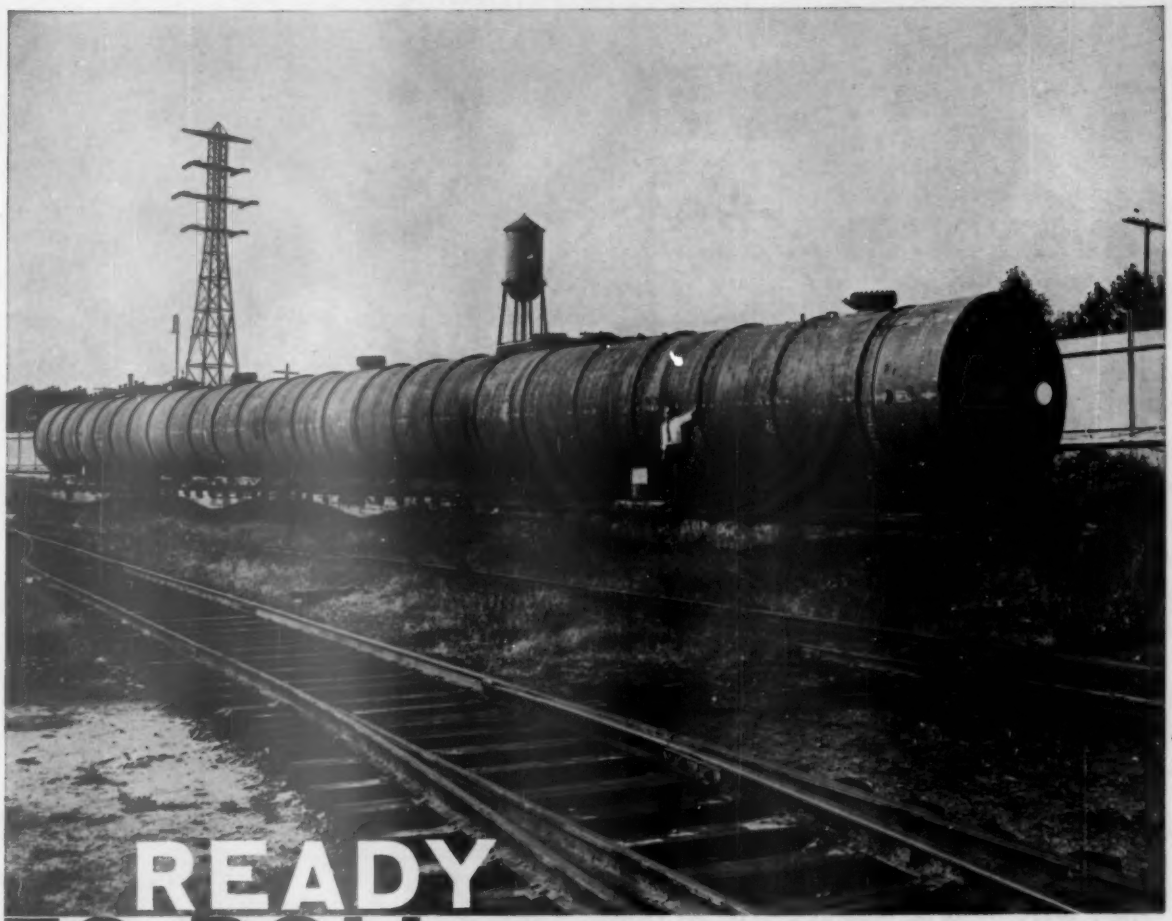
Eastern Seaboard Warehouse: Marsh Instrument Co., 1209 Anderson Ave., Fort Lee, N.J.

MARSH *Needle Valves*



READY TO ROLL . . .

Another big tower for industry

Building and delivering big items like the 165-foot-long fractionating tower pictured here is routine performance at Sun Ship. Two towers, each weighing 135 tons and identical with that shown above, were constructed for a petrochemical plant for processing petroleum gases. They were shipped on 9 flatcars. Railroad officials said it was one of the largest shipments ever moved by rail. Because of its length the shipment had to travel a circuitous rail route.

Whether it's a massive fractionating tower or intricate equipment, your requirements will be met with exacting precision and your product delivered on schedule by rail or water from our tidewater plant.

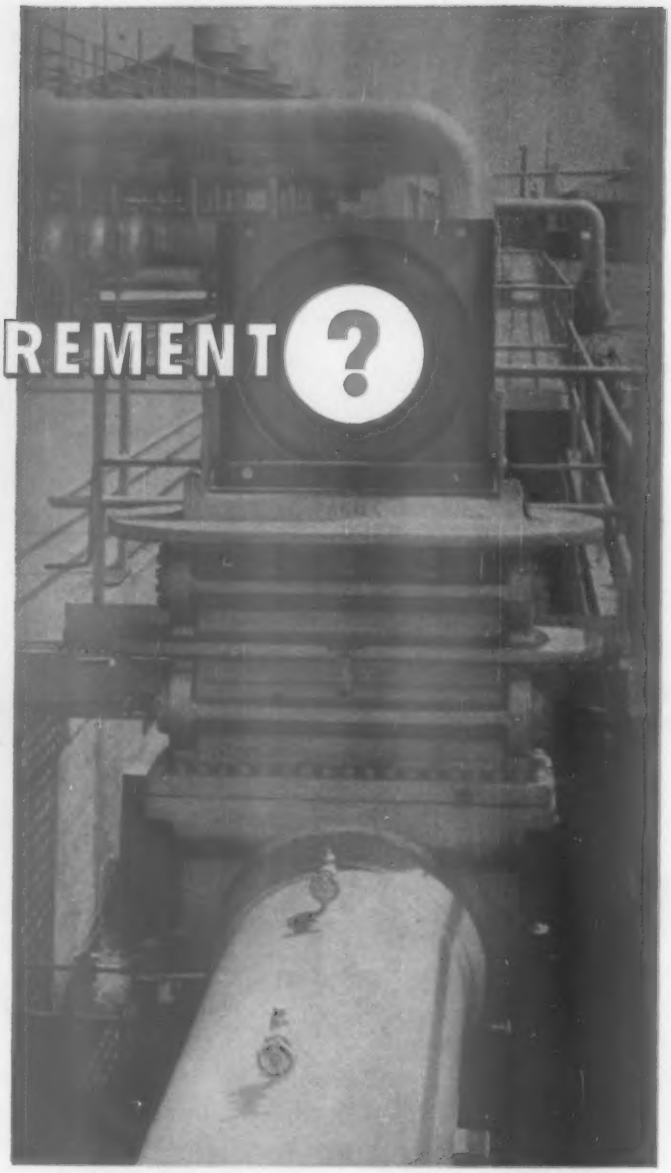
Sun Ship's modern fabricating and engineering services put these advantages at your fingertips. For full information, call or write our Sales Engineering Department.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE • SINCE 1916 • CHESTER, PA.

HAVE YOU THE EDGE IN MEASUREMENT?



Daniel 30" Senior Orifice Fitting on mainline gas measurement.

Accuracy in flow measurement, from orifice signal to final read-out, depends on many elements. Anything less than the best available system accuracy is too expensive.

The simple orifice plate, a most widely used primary device in measurement, is actually a precision instrument. At Daniel, experienced craftsmen turn out plates, from ¼" to 60" O.D., which better industry standards.

Simplicity of operation and stainless steel trim of Daniel Orifice Fittings are recognized, by measurement men everywhere, as guarantees of better service.

Meter Tubes from Daniel, of special seamless tubing, free from imperfections, provide closest tolerances for the most precise metering applications.

Now all the elements for precision metering are combined into an easy-to-order Daniel Packaged Meter Station.

These custom-designed units provide savings in field assembly costs, reduce order and delivery time, and permit full salvage when desired.

To have the edge in measurement, see your Daniel representative soon, or write direct for full information. You'll be glad you did.

from Orifice Plates to
complete Packaged Metering
and Regulating Stations
Daniel Products are made to Measure!

DANIEL ORIFICE FITTING COMPANY

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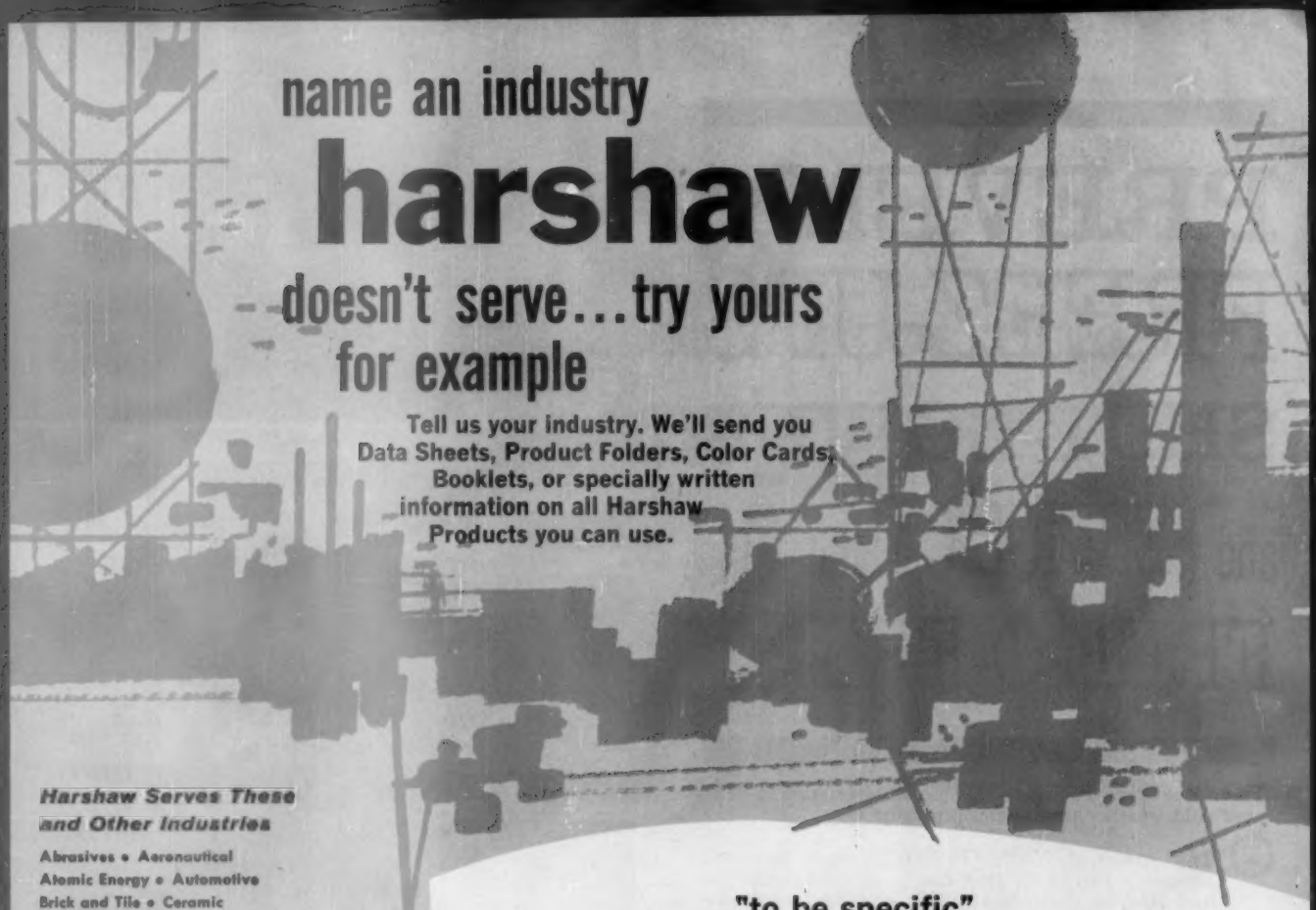

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Tell us your industry. We'll send you Data Sheets, Product Folders, Color Cards, Booklets, or specially written information on all Harshaw Products you can use.

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PREVENT FREEZ-UPS SHUT-DOWNS and SERVICE CALLS with FREE-O-FREEZ™

There is a BS&B FREE-O-FREEZ unit designed to solve your cold weather production problems:

1. *The spherical FREE-O-FREEZ heats the well stream in the heater flow coil to prevent freeze-ups and hydrate formations. The water-oil separator section is immersed in the hot water bath of the heater. This unit has been very popular on leases where all-weather operation is a must.*

2. *The "Double Dip" is identical to the spherical FREE-O-FREEZ except that it processes two well streams in the same unit at the same time.*

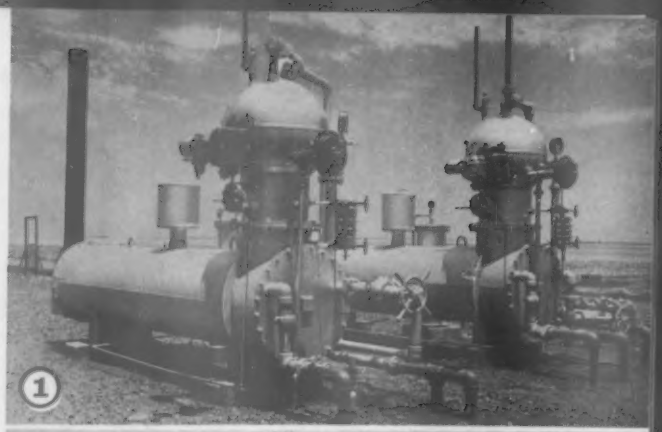
3. *This versatile unit designed to handle gas streams containing viscous fluids that tend to foul the operation of conventional equipment. This is another example of how BS&B engineering and know-how solves difficult production problems.*

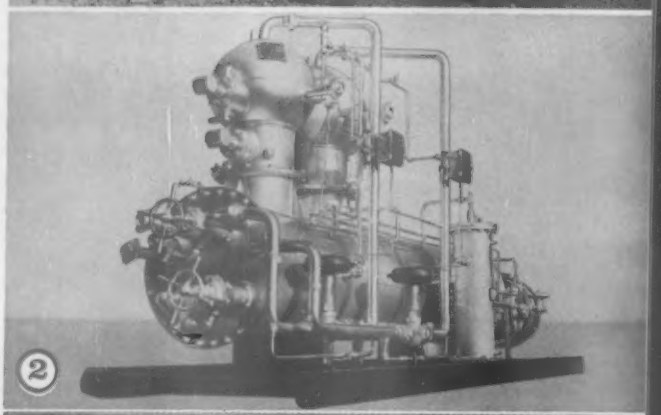
4. *The horizontal FREE-O-FREEZ is recommended for leases where there are surge problems. Inlet gas heat is utilized to keep liquid from freezing in the separator. This is accomplished by piping the inlet gas through a coil in the liquid section of the separator.*

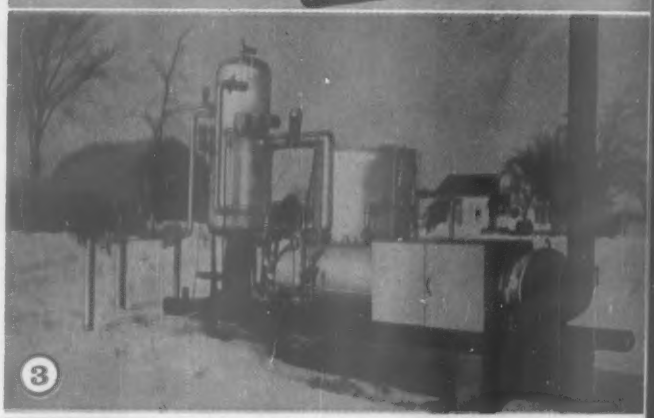
FREE-O-FREEZ units are Compact, Skid-mounted, and provide Dependable, Automatic, Trouble-free operation in all types of weather. FREE-O-FREEZ units are equipped with a safety first—the BS&B flash arrestor which eliminates flash backs and provides maximum burner safety.

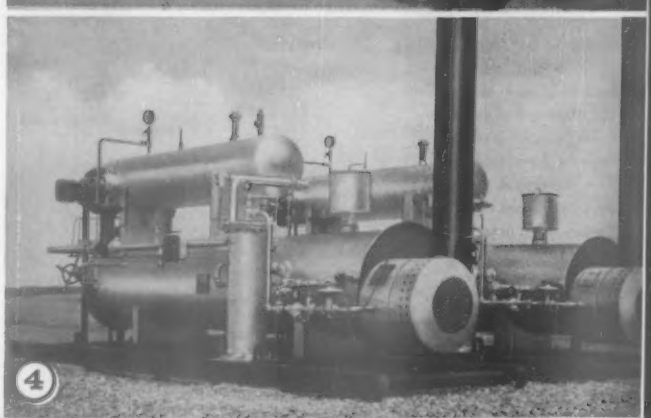
A call to your local BS&B representative is all that's needed to end your cold weather lease production problems: Or write: BS&B, Dept. 9-A1 7500 East 12th Street, Kansas City, Missouri.

FREE-O-FREEZ is a trademark of BS&B









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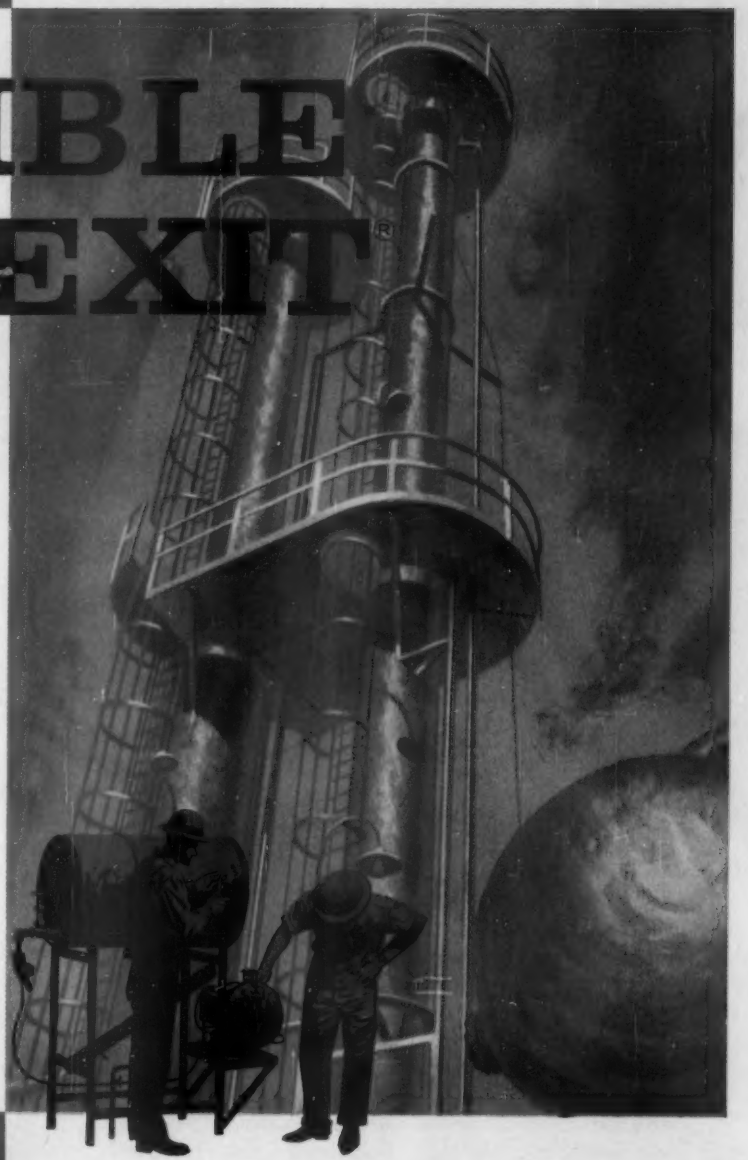
OKLAHOMA CITY • KANSAS CITY • TULSA • EDMONTON • THE HAGUE

98% protection* against internal corrosion

HUMBLE COREXIT®



* *Ten years of measurements* in refineries and gas plants prove its high efficiency and economy. For as little as 50¢ per thousand barrels of throughput, Humble COREXIT prevents internal corrosion in pipe still overhead, distillation towers, vapor recovery systems and other refining units. Equipment life is extended, you make longer runs between turn-arounds, and down time is reduced. *COREXIT makes important savings in every refinery and gas plant where it is used.* For complete information on technical services and COREXIT formulations to meet your specific requirements, see your Humble salesman or contact Humble Oil & Refining Company, Houston, Texas.

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HUMBLE OIL & REFINING CO.

America's Leading ENergy COmpany

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SERVICES
STORES

99 years after the yellow dog

Not long after Col. Drake drilled his well, Oil Well Supply was in business and one of our earliest products was this "yellow dog," used for illumination. You can't buy a "yellow dog" from us today, but you *can* buy everything you need for the drilling, producing, refining and transporting of petroleum products . . . everything from a complete drilling rig to a handful of nails.

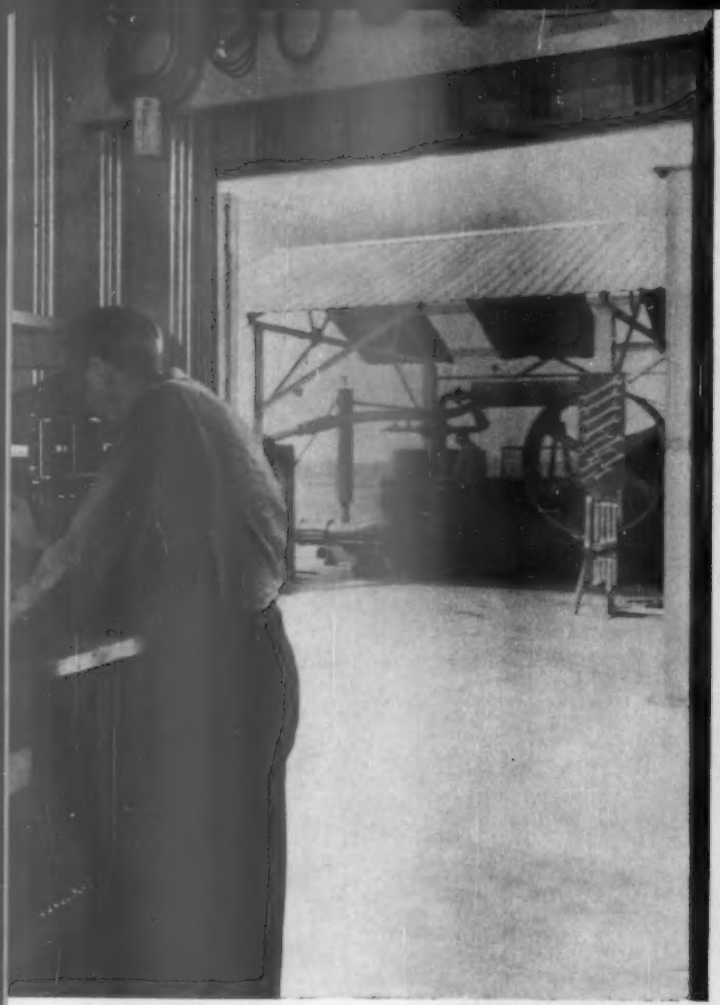
"Oilwell"-designed, -developed, and -field-tested machinery and equipment includes complete drilling rigs, surface and subsurface pumping equipment, reciprocating and centrifugal pumps, engines and compressors.

Distinct advantages to the user come from the fact that much of what we offer has been conceived and manufactured for the petroleum industry's specific needs.

In addition, "Oilwell" distributes the best of well-head equipment—valves and fittings—and all of the essential general running supplies, including USS National Tube pipe and USS Tiger Brand wire rope.

This wide range of own-make and selected vendor equipment, which we carry in stock, enables us to provide for our customers' needs whatever and wherever they may be.

USS and "Oilwell" are registered trademarks



No hole but pay every day

This installation works overtime just about every day, and the "pay" it produces ends up in your pocket. It's an "Oilwell" test center where we simulate actual drilling and waterflood pumping conditions to assure the dependability of "Oilwell" Pumps and Parts. Conditions can be varied from light loads to excessive overloads, and we can duplicate the roughest service you'll ever encounter. Complete instrumentation measures and records wear and performance of slush pump and plunger pump fluid end parts; we test everything about a pump, even the V-belts, gaskets, packing and oilers. From the data we collect come new designs, improved products and, ultimately, the kind of reliable performance that lowers *your* operating costs. Extensive testing is only one of many "Oilwell" services, which include research, application, installation, and maintenance.

One-stop shopping

Suppose your want list read like this: one pumping unit—one gas engine—one polished rod—one 4" plug valve—two safety hats—one 24" pipe wrench—and a 10 lb. box of rags. Where do you suppose you could get it all—all at once? At your nearest "Oilwell" store, of course. We're in business to give you quality products when and where you want them. Whatever your need, you'll find that when you get it from an "Oilwell" store, it will be of the best quality and priced right. And you won't have to go far because "Oilwell" stores are located for the convenience of our customers. That's why we say—Wherever there's oil—there's "Oilwell".

USS TRADEMARK

Oil Well Supply Division of United States Steel

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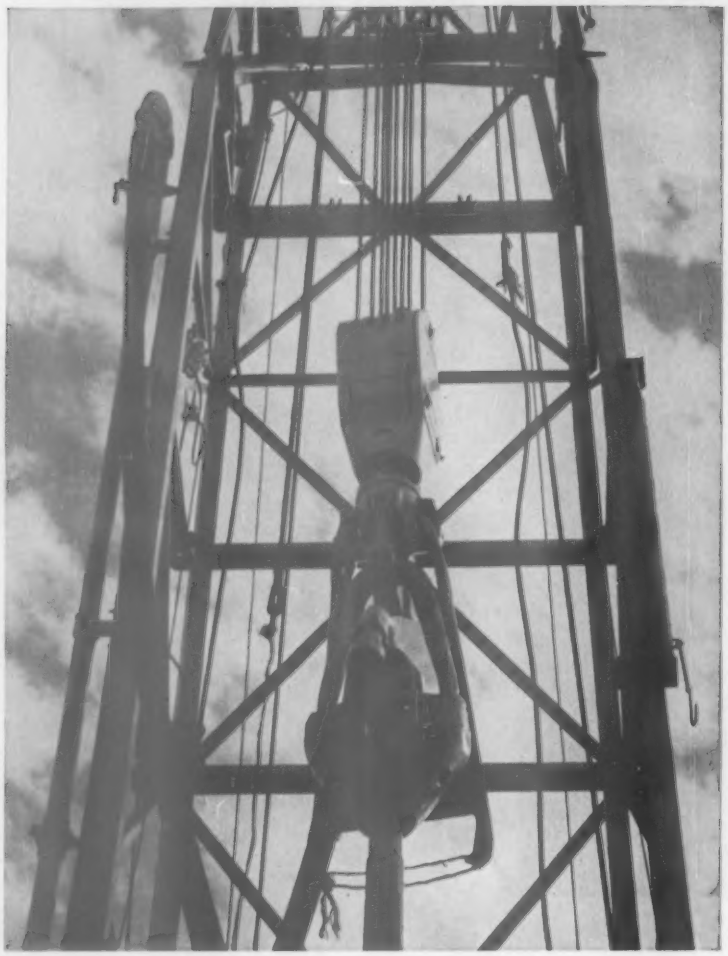
R/M Makes The ONE Rotary Hose For ALL Drilling Methods



Use RAY-MAN CBL ROTARY HOSE with MUD • AIR • GAS • or GAS and MUD

FEATURES

- **Withstands high velocity heated air and gas to 160° F.**
- **Maximum resistance to abrasion from dry drillings during reverse circulation**
- **Resists sand abrasion when used with gas direct from natural wells**
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- **Holds steady in the derrick under deepest drilling conditions—without whipping!**
- **Exclusive built-in coupling eliminates fouling . . . leak-proof "Lip-Lok" tightens under pressure to prevent blowouts!**
- **Features oil-proof neoprene tube**

Now . . . use the best method of drilling depending on hole conditions—and use the *same* Ray-Man CBL Rotary Hose. Changing from oil base mud to air or gas as a circulation medium—or to a combination of gas and mud—presents no problem for Ray-Man Rotary Hose. These built-in engineered features assure long, trouble-free rig performance for *all* drilling service.

Ray-Man's exceptional resistance to accidental crushing and built-in, streamlined couplings make it easier to rig up . . . easier to transport from site to site. Get "More Use per Dollar" with Ray-Man CBL Rotary Hose . . . *the hose* for *all* drilling service. Write for Bulletin M651.

RM 129

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All producing functions have been automated for unattended operation from wellhead to pipeline—with only routine maintenance, and periodic pick-up of printed Brodimatic counter readings. For LACT and every need investigate Brodie systems and equipment.

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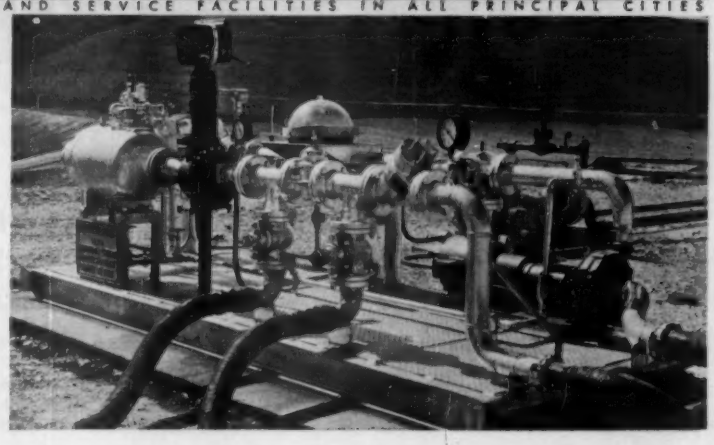

* Skid-mounted BRODIE BiRotor LACT Unit, engineered and assembled by Power Rig and Equipment Co., Inc., Long Beach, California

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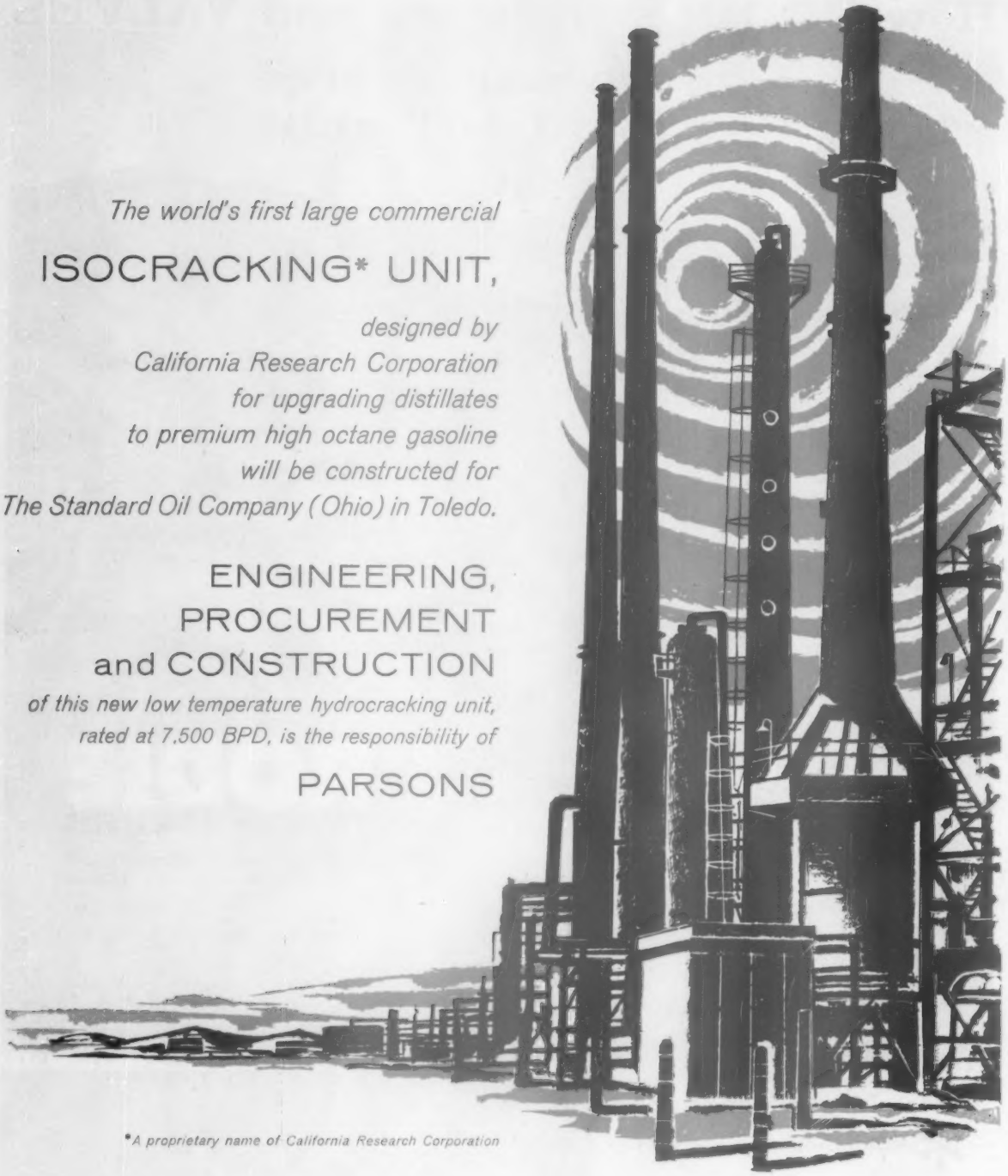

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They Say—

A disputed area

Dear Sir:

In my opinion you won't fail to receive many letters from our country on the first of the three articles by Paul Swain on the oil picture in Indonesia (OGJ, July 31, "Private Oil Losing Out in Indonesia," p. 116).

The map with the article gives what rightly carries the name of Netherlands New-Guinea a name which is not internationally accepted.

By giving this western part of New Guinea the name used (West Irian) and leaving Malakka (Malaya) and the Philippines open, your international editor, who surely knows better, gives the impression that President Sukarno already succeeded in his last point of propaganda in his political fight against our country.

How and why the Dutch retreated from their beloved "Circle of Smaragd" I leave to be said by others; that we were "tossed out" is a deterioration of the truth.

P. J. Drijver
The Netherlands

Atlantic looks abroad

"No matter how big $30 million may appear to any of us as individuals, it isn't enough profit for a business of our size. It represents only 4.3% on the money invested in our company.

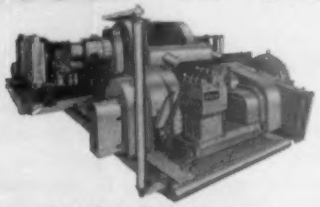
"You might well ask: 'Why hasn't Atlantic saved the high costs of exploration and made long-term contracts for part of our crude supply?' You can be sure this alternative wasn't overlooked by our management, but we have not been able to negotiate one and we don't know of any American competitor that has.

"Therefore, if we hadn't spent money to find our additional supplies in the United States, Canada, and Venezuela, we would be pinched even harder by severe proration and we certainly wouldn't have our present import quotas by

Don't fight it...

CHECK

WILSON SUPER MOGUL "42" RIG



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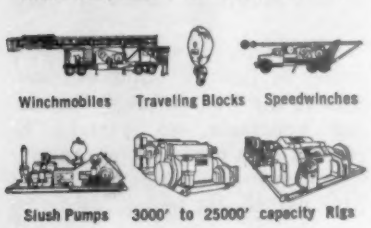

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Slush Pumps 3000' to 25000' capacity Rigs

which we can hope to import low cost foreign oil.

Thus, if we hadn't taken risks to obtain our potential self-sufficiency, our squeeze would be far worse.

"New flexibility has been built into our company. We are now better adjusted to swings of the oil industry. If conditions were to change suddenly, we could quickly step up our production in this country, in Canada, or in Venezuela.

"Despite this new flexibility, we are not comfortable.

"We can't afford to have all our foreign eggs in one basket. Therefore we are committed to additional exploration efforts in Bolivia, Spanish Sahara, and Libya."

Henderson Supplee, Jr., president, Atlantic Refining Co., in a speech to Atlantic refinery supervisors.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

SEPTEMBER

5-8 American Chemical Society, Chicago section, eleventh national chemical exposition, International Amphitheatre, Chicago.

7-8 Rocky Mountain Association of Geologists, field conference, Salida, Monarch, Ouray, Silverton, and Durango, Colo., areas.

7-9 Magic Plains Oil Exposition, Borger, Tex.

7-9 Alberta Society of Petroleum Geologists and Geological Association of Canada, convention and field trip, Canadian sedimentary basins, Calgary.

11-15 Instrument Society of America, fall instrument-automation conference and exhibit and sixteenth annual meeting, Biltmore Hotel and Memorial Sports Arena, Los Angeles.

12-13 American Gas Association, Southern Gas Association, annual accident prevention conference, Statler Hilton Hotel, Dallas.

13-15 Pacific Coast Gas Association, convention and annual meeting, Coronado Hotel, Coronado, Calif.

13-15 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

13-15 National Petroleum Refiners Association, fall meeting, Traymore Hotel, Atlantic City, N. J.

13-15 National Northern Development Conference, "Canada's New Role in Resource Development," MacDonald Hotel, Edmonton.

14 Natural Gas Processors Association, Rocky Mountain regional meeting, Northern Hotel, Billings, Mont.

15-16 Kansas Geological Society, annual

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Turbocharged planet-drive "25" blades full loads, full time at 11,000 ft.

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"Our International TD-25 more than matches oil field work up here at 9,000 to 11,000 feet altitude in the Rocky Mountains," reports John Stevens, for Hayter & Stevens, Big Piney, Wyoming.

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Never "short of breath," the International TD-25's DT-817 Diesel has dual-valve, free-breathing design. Unrestricted air intake lets exhaust-gas-driven turbocharging give you high power-producing efficiency—from sea level to above timber line.

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And on-the-go, TD-25 Hi-Lo power-shifting lets you match power to condition, instantly—to prevent production-losing "gear shift lag."

Get on-the-lease proof that the TD-25 outproduces king-sized clutch-steered rigs up to 50% or more—clearing land, benching out roads—preparing drill rig sites—digging pits. Let your International Construction Equipment Distributor demonstrate.

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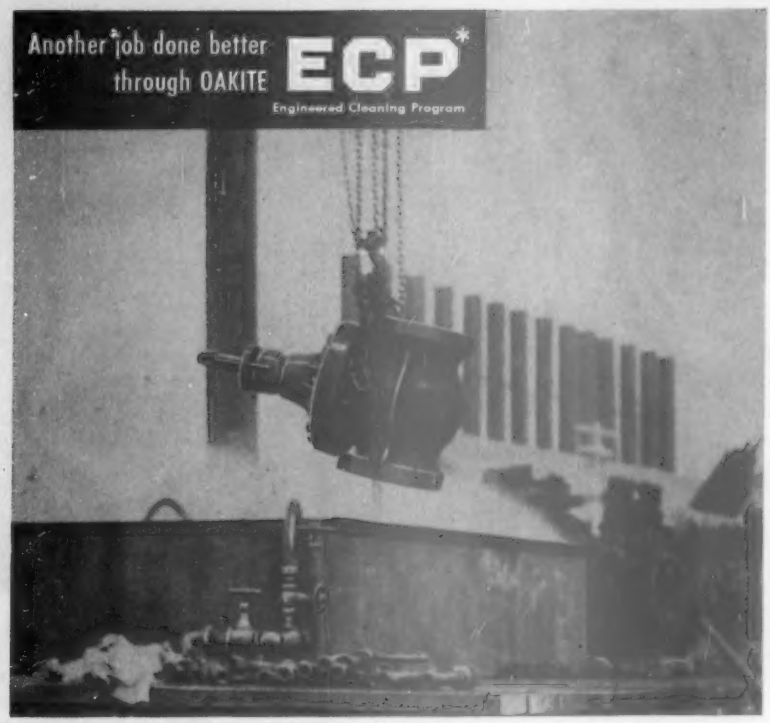

Parts salvage becomes big source of savings

Salvage cleaning of flanges, fittings, valves and other parts formerly took up to 22 hours a batch at one refinery. Heavy deposits of grease, paint, oil and rust were being stripped with a cold solvent. The effort seemed hardly worthwhile.

But in developing an ECP for the refinery, the Oakite engineer included a recommendation to install a permanent salvage cleaning set-up. It paid off. Parts reclamation became a strong contributor to cost control . . . with work moving, as if in a "production line," through special Oakite solutions. Stripping even the worst of soiled batches to bare metal now takes only an hour and a half . . . while material costs have been cut from $1.90 a gallon to less than 58 cents!

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*Oakite ECP is a comprehensive cleaning program engineered to fit your particular operation under the experienced supervision of a local Oakite man. ECP covers every cleaning need. For details, write Oakite Products, Inc., 44C Rector Street, New York 6, N. Y.

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at drilling site it speeds such salvage operations as paint stripping, rust removal, degreasing

it restores pipeline efficiency through chemical cleaning... it simplifies pump station housekeeping

field conference, Mark Twain Hotel, Hannibal, Mo.

17-20 American Institute of Electrical Engineers, annual electrical conference of the petroleum industry, Jung Hotel, New Orleans.

18-19 Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.

18-20 Standards Engineers Society, tenth annual meeting, Hotel Sherman, Chicago.

20 API, Coalinga - Kettleman chapter, annual barbecue and golf tournament, Polvadero Country Club, Coalinga, Calif.

20-21 National Petroleum Refiners Association, Rocky Mountain regional meeting, Henning Hotel, Casper, Wyo.

20-21 American Institute of Electrical Engineers, Institute of Radio Engineers, Instrument Society of America, industrial electronics symposium, Bradford Hotel, Boston.

20-21 Ohio Petroleum Marketers Association, fall conference, Commodore Perry Hotel, Toledo.

20-22 National Association of Corrosion Engineers, Permian Basin section, annual West Texas corrosion tour, Lincoln Hotel, Odessa, Tex.

21-22 Air Pollution Control Association, east-central section, annual meeting, Sheraton-Seelbach Hotel, Louisville, Ky.

22-23 Association of Desk and Derrick Clubs, tenth annual meeting, Rice Hotel, Houston.

24-27 American Institute of Chemical Engineers, national meeting, Lake Placid Club, Lake Placid, N. Y.

24-27 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Muehlebach Hotel, Kansas City.

25-27 Texas Mid-Continent Oil and Gas Association, annual meeting, Texas Hotel, Fort Worth.

25-28 American Welding Society, fall meeting, Adolphus Hotel, Dallas.

OCTOBER

1-4 American Gas Association, annual convention, Dallas.

3-4 University of Kansas, ninth annual gas measurement institute, National Guard Armory, Liberal, Kans.

4-6 American Association of Oilwell Drilling Contractors, annual meeting, Rice Hotel, Houston.

4-6 American Society of Mechanical Engineers, process-industries conference, Shamrock-Hilton Hotel, Houston.

4-6 American Society of Photogrammetry, semiannual convention and technical exhibit, Biltmore Hotel, New York.

5-7 Southwestern Legal Foundation, American Association of Petroleum Landmen, third national institute for petroleum landmen, Dallas.

6-8 New Mexico Geological Society, annual field conference, geology of the Albuquerque country, registration Oct. 5, University of New Mexico, Albuquerque.

8-11 Society of Petroleum Engineers of AIME, annual fall meeting, Memorial Auditorium, Dallas.

11-12 National Petroleum Refiners Association, waste disposal and stream pollution conference, Hotel Lassen, Wichita.

12-13 California Natural Gasoline Association, annual fall meeting, Lafayette Hotel, Long Beach, Calif.

15-17 National Association of Oil Equipment Jobbers, annual convention

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Layne Submersible Pumps are available for wells as small as 6 inches and in capacities from 30 GPM up. For additional information write for free bulletin number 202.

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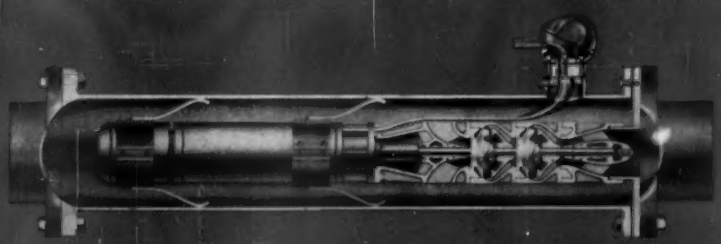

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15-18 American Petroleum Credit Association, annual conference, Shamrock-Hilton Hotel, Houston.

17-19 American Society of Mechanical Engineers, American Society of Lubricating Engineers, lubrication conference, Morrison Hotel. Chicago.

18-20 Rocky Mountain Oil and Gas Association, annual convention, Denver-Hilton Hotel, Denver.

18-21 American Association of Petroleum Geologists, Mid-Continent regional meeting, Amarillo, Tex.

19 West Central Texas Oil and Gas Association, annual meeting, Hotel Windsor, Abilene, Tex.

19-21 National Society of Professional Engineers, fall meeting, Hotel Roanoke, Roanoke, Va.

19-22 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

20 American Institute of Chemical Engineers, South Texas section, annual technical meeting, Moody Civic Center, Galveston, Tex.

24-25 Pennsylvania Grade Crude Oil Association and Pennsylvania State University Mineral Industries Experiment Station, technical conference on oil recovery by solvents, Pennsylvania State University campus, University Park.

24-25 University of Kansas, Southwest Kansas Center, sixth annual natural-gas pipeline institute, Court House, Liberal, Kans.

24-27 National Association of Corrosion Engineers, south-central region conference and exhibition, Shamrock-Hilton Hotel, Houston.

25-26 National Petroleum Refiners Association, annual question and answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark.

25-27 Gulf Coast Association of Geological Societies, annual meeting, Granada Hotel, San Antonio, Tex.

27 Natural Gas Processors Association, southern regional meeting, Carlton Hotel, Tyler, Tex.

29-31 Independent Petroleum Association of America, annual meeting, Shamrock-Hilton Hotel, Houston.

29-Nov. 1 National Lubricating Grease Institute, annual meeting, Rice Hotel, Houston.

NOVEMBER

1-3 Southwest Federation of Geological Societies, annual meeting, Hilton Hotel, El Paso, Tex.

2-3 Society of Petroleum Engineers of AIME, annual California regional meeting, Hacienda Motel, Bakersfield, Calif.

2-3 API, annual agriculture-petroleum seminar, Louisiana State University, Baton Rouge.

2-4 Geological Society of America, annual meeting, Cincinnati, Ohio.

5-9 Society of Exploration Geophysicists, international meeting, Denver.

6-8 Chemical Institute of Canada, conference of the chemical engineering division, Royal York Hotel, Toronto.

9-10 Society of Automotive Engineers, national fuels and lubricants meeting, Shamrock-Hilton Hotel, Houston.

13-15 American Petroleum Institute, forty-first annual meeting, Conrad Hilton, Congress and Palmer House hotels, Chicago.

16 Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill.

17 Natural Gas Processors Association, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

26-Dec. 1 American Society of Mechanical Engineers, winter annual meeting, Statler-Hilton Hotel, New York City.

DECEMBER

3-6 American Institute of Chemical Engineers, annual meeting, New Yorker Hotel, New York City.

4 AIME's Society of Petroleum Engineers, Arizona section, annual meeting, Pioneer Hotel, Tucson.

4-6 Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver.

5-6 National Petroleum Refiners Association, computer conference for refiners, Hotel Tulsa, Tulsa.

JANUARY

7-10 Pipe Line Contractors Association, annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.

16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.

19 Natural Gas Processors Association, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

FEBRUARY

4-7 American Institute of Chemical Engineers, national meeting, Statler Hotel, Los Angeles.

14-17 Pipe Line Contractors Association of Canada, Castle Harbor Hotel, Bermuda.

15-17 Southwestern Legal Foundation, annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

18-22 American Institute of Mining, Met-

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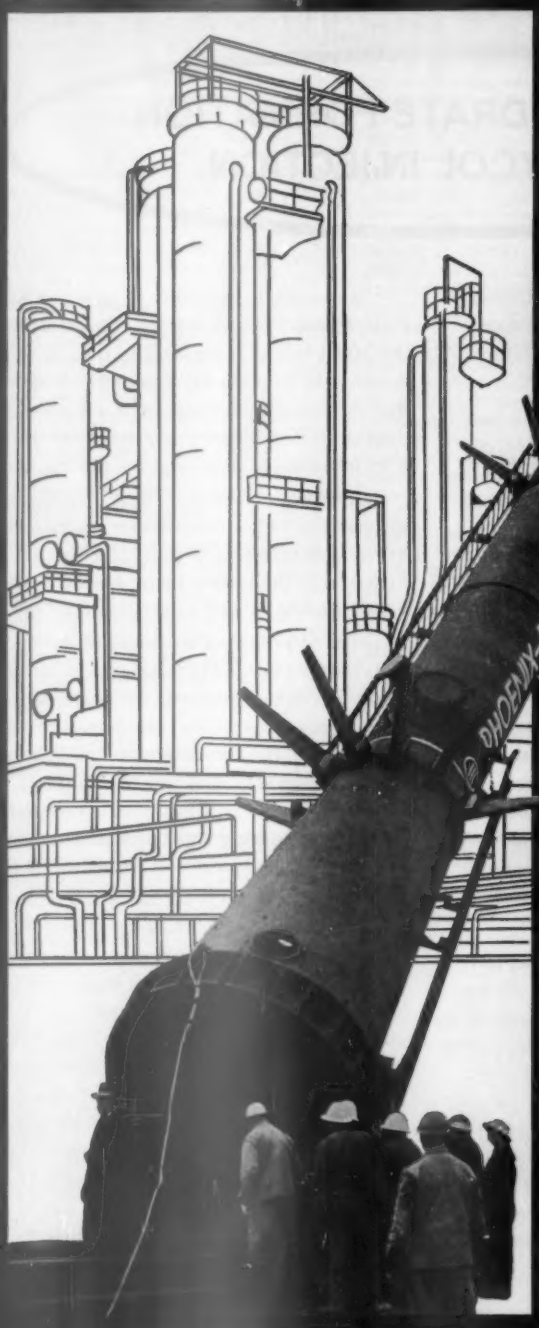

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spherical caps and segments, hot-pressed
for spherical containers
heads, hot-pressed · flanged and flad heads
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JEFFERSON GAS TREATING BRIEFS

INHIBIT HYDRATE FORMATION BY GLYCOL INJECTION

Gas hydrates are crystalline compounds formed by the chemical combination of natural gas and water. These hydrates form under pressure at temperatures considerably above the freezing point of water.

Problems associated with the freezing of free water and/or hydrate formation are often encountered in low temperature processing of natural gas for the recovery of light hydrocarbons. In processing of gases below their water-vapor dew points, hydrate formation can be prevented by the injection of a freezing point depressant.

CHOICE OF HYDRATE INHIBITOR

The inhibitors which have been most widely used are ethylene glycol, diethylene glycol and methanol. The glycols are preferred in most cases since they can be recovered and reused. The glycols are normally injected as an 80 to 85 wt.% aqueous solution. Injection rates are set on the basis of the water content of the gas so that a maximum 10 to 15 wt.% further water dilution of the glycol occurs.

Proper choice of the glycol to be used is dependent primarily on the temperatures involved during the injection and recovery of the glycol solution. Roughly speaking, ethylene glycol should be considered for temperatures below 0 to $-20°$F. and diethylene glycol above this temperature range. Ethylene glycol has the advantage over diethylene glycol of being less viscous at low temperatures, less soluble in the hydrocarbon condensate and cheaper. At higher temperatures diethylene glycol may be preferred due to lower glycol vaporization losses.

DESIGN CONSIDERATION AND OPERATING PROBLEMS

One of the more common problems encountered in glycol injection systems is loss of glycol to the hydrocarbon phase due to insufficient residence time in the glycol-hydrocarbon condensate separator.

Although the solubility of glycol in hydrocarbon is decreased by lowering the separator temperature, this effect is lost if the settling time in the separator is too short to allow for complete breakdown of the hydrocarbon-glycol emulsion normally formed. Settling or residence time in the separator will vary from 4 to 60 minutes depending on process conditions.

Removal of entrained heavy hydrocarbons from the gas prior to low temperature processing and glycol injection is necessary to prevent a build-up of tar-like materials in the system that cause filter and injection nozzle fouling as well as erratic pump operations.

The formation of emulsions of the glycol solution and hydrocarbon condensate can often occur as a result of contamination of the glycol solution by oil field treating chemicals, compressor lubricating oils and valve lubricants. Where this problem occurs, the best approach is to eliminate the source of contamination. If the source of contamination cannot be located or eliminated, the use of demulsifiers or emulsion-breakers will often control emulsion formation.

Proper dispersion of the glycol solution into the gas stream prior to chilling or expansion is a must. Spray nozzles are the most commonly used means of dispersing the glycol in the gas streams and are usually located a short distance upstream of the chiller or choke. Manufacturers of the various type spray or fogging nozzles should be consulted to assure the proper choice of nozzle for any given set of conditions. It is important that glycol be dispersed sufficiently in the gas stream so that all chiller tubes are protected against hydrate formation. Formation of hydrates in any of the chiller tubes causes an increase in velocity and pressure drop through the remainder of the tubes which increases the possibility of their freezing. Excessive velocity of the gas through the tubes is also conducive to foaming and formation of emulsions.

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JEFFERSON CHEMICALS

071

allurgical, and Petroleum Engineers, annual meeting, New York City.

27-Mar. 2 International Oil and Gas Educational Center, institute on economics of the gas industry, Southwestern Legal Center, Dallas.

28-Mar. 2 American Petroleum Institute, Division of Production, southern district meeting, Rice Hotel, Houston.

MARCH

2 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

4-8 American Society of Mechanical Engineers, gas turbine-process industries conference, Shamrock Hilton Hotel, Houston.

16 Natural Gas Processors Association, Oklahoma regional meeting, Sheraton-Oklahoma Hotel, Oklahoma City.

18-22 National Association of Corrosion Engineers, meeting, Municipal Auditorium, Kansas City, Mo.

19-22 Kentucky Petroleum Marketers Association, management institute conducted by the University of Louisville, Brown Hotel, Louisville, Ky.

21-23 New England Gas Association, annual meeting, Statler-Hilton Hotel, Boston.

21-23 American Petroleum Institute, Division of Production, southwestern district meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, joint annual meeting, Fairmont Hotel, Civic Auditorium, San Francisco.

APRIL

4-6 API, Division of Production, Mid-Continent district meeting, Sheraton Oklahoma Hotel, Oklahoma City.

9-10 Instrument Society of America, national chemical and petroleum instrumentation symposium, Wilmington, Del.

11-12 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, convention and exposition, Dallas.

11-13 API, Division of Production, Rocky Mountain district meeting, Hilton Hotel, Denver.

15-18 American Society of Mechanical Engineers, oil and gas power division conference, Shoreham Hotel, Washington.

17 Society of Plastics Engineers, Philadelphia section, regional technical conference, Sheraton Hotel, Philadelphia.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

17-19 American Society for Metals, regional conference and exhibition, materials and materials processing for the petroleum, petrochemical and chemical industries, Shamrock Hilton Hotel, Houston.

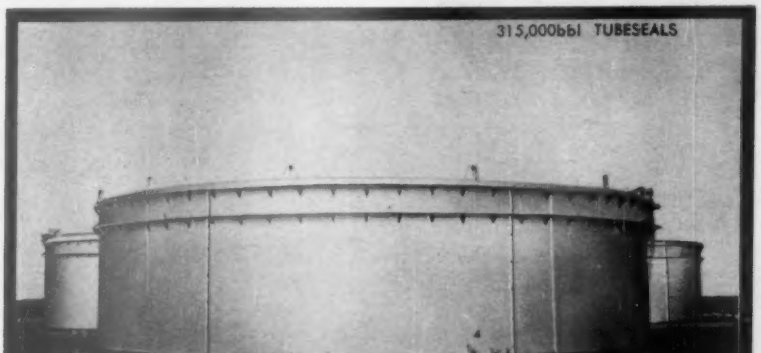
23-25 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Salt Lake City.

25-27 Natural Gas Processors Association annual convention, Hilton Hotel, Denver.

29-May 1 Independent Petroleum Association of America, midyear meeting, Hotel Muehlebach, Kansas City.

29-May 2 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

29-May 2 Southern Gas Association, annual meeting, and American Gas Association, transmission conference, Rice Hotel, Houston.



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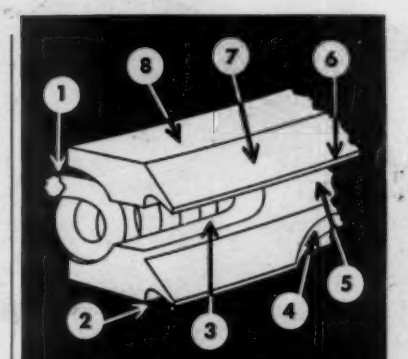

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50 years ago

September 7, 1911

North Texas continues to attract most attention of any of the fields now under development. At present it is difficult to predict the future of Electra field, but if any of the outside tests come in big, it will mean a hurried rush of work. Leases have been taken on practically all of North Texas and some fancy prices have been paid for property.

President Madero of Mexico made the following statement this week: "All capitalists, foreign as well as national, will have every guaranty under my government, and I will always with pleasure see foreign capital invested in Mexico."

The steamship Appalachee is due at Sabine in the next few days. It will load out 35,000 bbl. of refined oil to Europe. Magnolia Petroleum Co. will ship the oil. This is the first foreign shipment of the Magnolia company since its reorganization.

25 years ago

September 3, 1936

What is now probably the most active leasing and drilling campaign in the Mid-Continent region is being carried on around the Sabine uplift of East Texas and West Louisiana. This activity extends into South Arkansas. With the discovery of oil at Talco, Tex., interest has been revived in the area bordering the Balcones fault zone all the way from Bowie County in the extreme northeast corner of Texas to the old Powell field in Navarro County.

10 years ago

September 6, 1951

Radioactive isotopes produced at the atomic-energy plant at Oak Ridge are now being used experimentally in the control and evaluation of oil-well acidization treatments. The isotopes are Iodine-131 (Molecular weight).

Diesel locomotives are now hauling trains for less than half the fuel cost of steam engines, thereby saving millions of dollars monthly for the railroads.

Recent developments in southwestern Oklahoma have turned up additional evidence that the immense importance of the Springer sands from the standpoint of ultimate reserves has not been overestimated. The potentialities of the Springer (Pennsylvanian Morrow-Springer and lower Dornick Hills) have been growing constantly since they were first recognized about 7 years ago when Skelly Oil Co. found oil-saturated Springer sands off the northeast flank of Velma field.

JOURNALLY SPEAKING

The "Petro" Chemicals

WAY BACK in the mid-'20's when Herbert Hoover was Secretary of Commerce and trying to expand American business and foreign trade, the chief of the Department of Commerce chemical division had a big argument with the then president of Standard Oil Co. (N. J.).

"You are in the chemical business," said the D. of C. man. "You ought to realize it and cash in on it."

"Nuts," said the Jersey man in effect (though doubtless in more diplomatic phraseology). "How silly can you get? We're in the oil business. Chemicals is something else again."

But a couple of years later Jersey and some other oil companies began to admit that petroleum might be a chemical raw material with potentialities worth exploring.

Jersey's lack of enthusiasm for chemistry perhaps could be blamed on its unrewarding experience during the period immediately after World War I when the U. S. was cut off from chemicals it formerly imported from Europe.

At that time Jersey hired some chemists and told them to try to make something useful from petroleum other than gasoline and fuel oil. They worked and worked and worked and about the only thing they came up with was a replacement for Russian white mineral oil which Jersey marketed through drug stores as Nujol — and you know where that ended up.

But now look at the situation! There's hardly an oil company of any size that isn't in the chemical business one way or another, and some of them are up to their necks in chemicals.

As evidence we offer (starting on page 118) the Journal's annual world-wide survey of petrochemical plants. This is the world's largest and best petrochemical survey, natch, and it's the product of 4 months' work and some 500 letters.

You may be impressed with the number of foreign plants we list (everything outside of the Iron Curtain), and this took quite a bit of doing. Our word "petrochemicals" throws foreigners for a loop. They don't see any sense in trying to differentiate between petrochemicals and all other organic chemicals or "carbochemicals."

But it makes sense to us. To a chemist, of course, an end product is exactly the same whether it was made from oil, coal, grain, wood, or sea water, and a user may not give a hang about the source material.

But we're an oil publication and our readers are oil men, and we want to know what chemicals are being made out of petroleum, and how much, and where, and which oil companies are doing it.

Besides, we have a paternal pride in that word "petrochemical." The Journal coined it, back about the beginning of World War II when oil-based chemicals got their first real shove. It seemed a handy designation to us then and it still does. Perhaps it puzzles the chemical people in countries that never had much of an oil industry, but "petrochemicals" has a very real meaning to American oil men.

It's the fastest-growing branch of the oil business, and while it consumes only around 3% of the volume it brings in some 15% of the industry's revenue.

In fact, petrochemicals may be growing a little too fast. With so many companies getting into the act, the business may be heading for dog-eat-dog competition. It's getting so now that just building a plant to turn out some basic petrochemical won't get you very far. You've got to do a lot of research to convince some processor that he can develop new markets by making something out of a product three or four steps removed from your basic chemical.

Which is why we think there is a real need for our breakout of petrochemical companies, plants, and products. Maybe the users don't care whether a product came from petroleum, but our readers do.

—Henry D. Ralph.

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"This strange kind of thinking could be contagious"

THIS IS ONE of the Journal's more glamorous issues. It steps to the quick tempo of the booming petrochemical industry in which oil companies are becoming deeply involved.

Time was when we talked a great deal about the "magic" of petrochemicals. They did have a certain allure and a lot of oil companies found them a new adventure in profits. But others got burned in the process, some of them badly.

Today the magic bit is old hat. But still, an aura of witchcraft remains. There's something unworldly and disturbing about this venture into chemicals.

It's so unsettled. For example, product "A," a basic building block, goes out of fashion because a better, cheaper building block "B" has been found to do the same job. So what happens? Two or three companies promptly announce plans to add umpteen million pounds of—not the new "B," but the old "A." Result: the price of "A" goes down and it starts giving "B" a good run for its money all over again.

THIS IS MOST disconcerting. It reflects a sad lack of over-all planning by someone in Washington. But nobody gives that someone a chance. When these petrochemical makers find themselves in a crack they don't realize that their Government stands ready to offer help, protection, and control. Instead of running to Washington, they simply take their lumps and proceed with some new tack to beat the pants off their competitors.

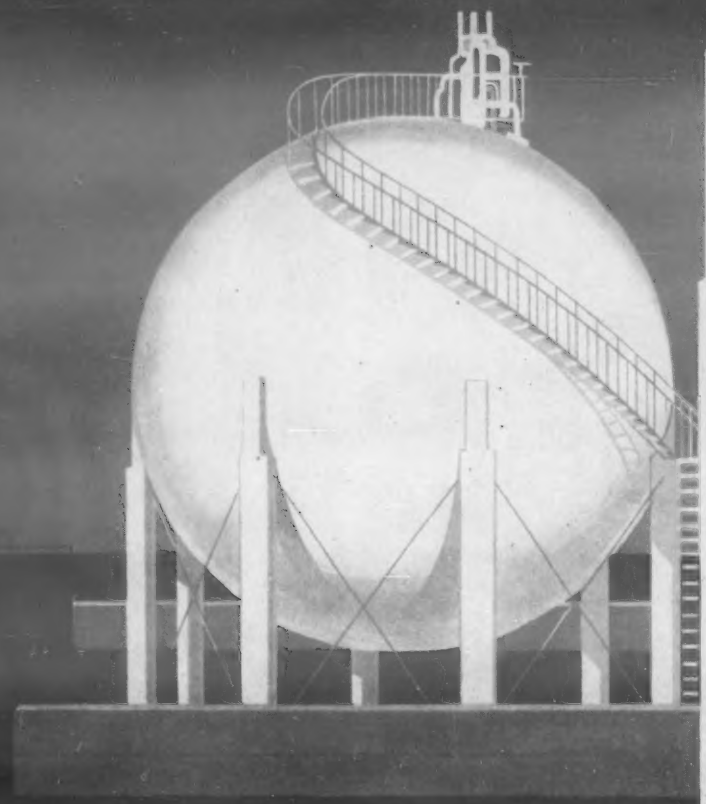
How on earth can this new industry hope to survive without proration of its crude supply, or fair-trade pricing, or tax incentives to attract outside capital? Why, there isn't even a quota system of controlled imports!

IN THIS WILD petrochemical game everyone acts as if it were a free country. The more excess capacity they add, the lower prices go and the bigger their markets grow. This sounds suspiciously like that thing our old economics professor used to talk about—free enterprise, wasn't it?

Petrochemical markets didn't just grow, like oil markets. They were dreamed up through research and imagination. The products themselves came first, from the laboratories. Then someone stirred around and found uses for them.

Oil men, beware. This strange kind of thinking could be contagious. It might even result in the oil industry finding itself some new markets for plain old petroleum products.

FOR CANADIAN OIL FACTS CALL ON CANADA'S FIRST BANK*



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RESOURCES EXCEED $3 BILLION

Drilling-Crew Wages Are Going Up

- Some Gulf Coast contractors are paying their help 10% more, and the Mid-Continent is moving toward a 48-hour week and 5% raise. Either way, higher labor costs will be added to footage rates by contractors.

WAGES for drilling crews are going to move up sharply this fall.

The boost — first since May 1959—will be made by contractors generally throughout the Gulf Coast, Southwest, and Mid-Continent producing regions.

Reason for the increase is a rapidly-worsening shortage of experienced rig help which has been accentuated by this summer's moderate but prolonged increase in rig activity.

Contractors report losing more and more key men to other industries offering better wages and shorter hours. It is reaching a point where there just aren't enough experienced rig hands left to go around—and it promises to get still worse (OGJ, May 29, p. 99).

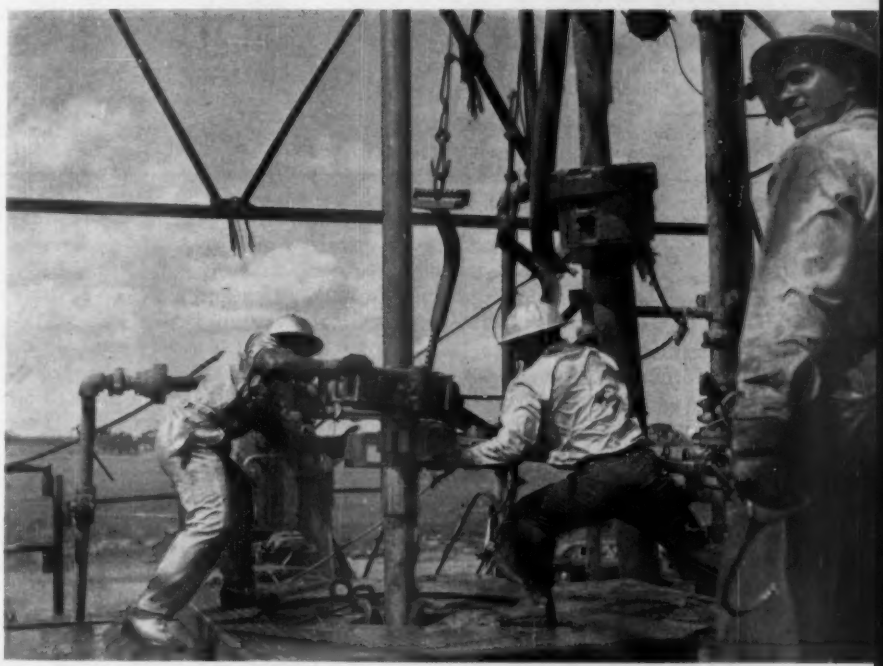
And most contractors have concluded they must do something to halt this trend before it is too late.

They admit present depressed footage prices and thin profit margins won't support wage boosts, especially of the size contemplated. So footage rates, they say, will simply have to go up.

Shorter hours, too? . . . Odds are that drilling crews not only will be making more money but will be working fewer hours.

It will be some weeks yet before individual contractors' wage actions shake out a clear pattern. But it appears most likely now that they will establish a 48-hour work week for the average rig crewman, plus a 5% increase in take-home pay.

If so, it would be the first break in the traditional 7-day, 56-hour work week in the huge Central U. S. oil belt since production was first found there.



TEAMWORK is the key to efficient rig operation. Contractors have found they can't keep their teams together under present wage scale. They hope pay increase will make it possible to build up an experienced labor pool.

Gulf rates hiked . . . Contractors in South Louisiana already have moved to raise wages. This action is expected to spread quickly to the north and west.

Already individual firms in Wichita and Oklahoma City have met the boost.

Penrod Drilling Co., Dallas, touched the match to the fuse in July by raising wage rates 10% for its Louisiana-Texas offshore and inland-barge crewmen without shortening the work week. Shortly after, several other contractors operating in South Louisiana raised 10% in the same categories and areas (See table on next page for pay scales.)

So far, at least 15 contractors are known to have met the 10% wage hike. They include, in addition to Penrod: Circle Drilling Co., Lake Charles, La.; Comet Drilling Co., Gradome Drilling Co., Power Rig Drilling Co., Owen Drilling Co., O. W. Dyer Drilling Co., Yates Drilling Co., and Gordon Drilling Co., all of Lafayette, La.;

Eggleston Drilling Co., Crowley, La.; Falcon Seaboard Drilling Co. and T-L Drilling Co., Houston; R. W. Rive Drilling Co., Wichita; and Nuckolls - Bell Drilling Co., Oklahoma City.

Further, Noble Drilling Co. has raised 10% in Oklahoma only.

Here's a comparison of labor costs for five-man crews

Classification	CURRENT COSTS 56-HOUR WEEK Hourly Wages	CURRENT COSTS 56-HOUR WEEK Weekly Wages	48-HOUR WEEK* WITH 5% INCREASE Hourly Wages	48-HOUR WEEK* WITH 5% INCREASE Weekly Wages	56-HOUR WEEK† WITH 10 % INCREASE Hourly Wages	56-HOUR WEEK† WITH 10 % INCREASE Weekly Wages
Driller	$2.86	$ 183.04	$3.70	$ 192.19	$3.14	$ 200.96
Derrickman	2.16	138.24	2.79	145.15	2.38	152.32
Motorman	2.16	138.24	2.79	145.15	2.38	152.32
Floorman	2.06	131.84	2.66	138.43	2.26	144.64
Floorman	2.06	131.84	2.66	138.43	2.26	144.64
Relief Men						
Driller (3 days)	....	.....	3.70	.....	.....	.....
Derrickman (6 days)	....	.....	2.79	.....	.....	.....
Floorman (6 days)	....	.....	2.66	.....	.....	.....
Unassigned (3 days)	....	.....	2.66	.....	.....	.....
TOTAL COST PER WEEK	....	$2,169.60	....	$2,723.76	....	$2,384.14
Additional Cost per Week Five-Man Crew				$ 554.16		$ 214.54
Additional Cost per Week Four-Man Crew				$ 371.04		$ 175.48

*Being considered by Mid-Continent contractors. †Already in effect along Gulf Coast.

West Coast wages . . . Some California contractors recently increased wages 5 to 10%, but they were falling in line with pay boosts granted earlier this year or late in 1960 by other contractors in that area.

California contractors traced their increase to a 5% pay raise oil companies gave the Oil, Chemical & Atomic Workers and other refinery union personnel last year, then later extended to all company wage earners.

Drilling-crew wages in California are well ahead of the rest of the oil patch. Average hourly rates paid by contractors are $4.27 for drillers, $3.38 for derrickmen, and $3.02 for roughnecks.

Wages not enough? . . . There is a powerful group in contractor ranks, however, which believes such a wage increase is not enough—that tough working conditions and no days off are prime reasons why the industry is losing its labor pool.

They favor cutting the work week from the present 56 hours down to 48 or even 42 hours. They point out that this isn't such a drastic change. A 42-hour week in California and a 48-hour week in Canada have been in effect for some time.

And, significantly, in this group fall the industry's biggest contractors. They have not started yet. But they will soon, probably before the end of September.

Reportedly leaning toward the shorter-work week are such companies as: Loffland Bros., Tulsa; Southeastern Drilling Corp., Dallas; Great Western Drilling Co., Midland; Delta Drilling Co., Tyler, Tex.; Helmerich & Payne, Inc., Tulsa; Rowan Drilling Co., Fort Worth; A. W. Thompson, Inc., Houston; Big Chief Drilling Co., Oklahoma City; Baker & Taylor Drilling Co., Amarillo; Arrow Drilling Co., Tulsa; Sharp Drilling Co. and Llano Drilling Co. of Midland.

A compromise in prospect . . . Informed sources feel most contractors will adopt the 48-hour week and 5% increase in take-home pay.

Strong evidence that this is the case came from Dallas last week. A large majority of some 25 contractors meeting in that city on the labor problem favored taking such action.

The 48-hour week plan would produce a spectacular increase in hourly wages but a relatively modest boost in weekly pay due to the 1 less working day.

With the simple 10% raise already granted by some, the weekly wage would be higher and the hourly wage lower while continuing on a 56-hour basis.

Going to a 48-hour week will require three relief men on a rig operating with five-man crews. One of the three relief workers could work only 3 days a week replacing the regular hands and do other work the remaining three days. (See chart above.)

If the contractor has two rigs working in the same vicinity, however, he could cut his total cost by letting one relief man fill in offdays on both rigs. This would cut the cost increase over the old pay scale by $13.68 a day, paring it to just $65.49 daily.

For a four-man crew, the 48-hour plan would cost the contractor about $371.04 a week and $53.04 a day more.

Will producers buy it? . . . The big question bothering contractors is whether oil producers still keeping a sharp eye on their own costs will stand still for hikes in footage rates sufficient to pay for the higher wages.

Most contractors are hopeful that operators will.

They will, that is, if the wage boost is made general throughout the drilling industry and is not just spottily adopted here and there. That's the feeling now.

Contractors readily admit that previous efforts to raise prices during the present period of surplus have flopped miserably. But they report also a growing awareness among producers of the critical nature of the rig operator's labor problem.

And there are indications, they say, that at least some producers

are willing to add to their own costs if that is vital to keep contractors operating efficiently. The idea here is that the added expense would serve as insurance against much greater costs in the event operators had to reequip and drill wells themselves.

The added cost, one contractor points out, would not be a great one when stacked up against the total cost of a well to the operator. Suppose a well took 30 days to drill and cost the operator a total of $60,000 under the present wage scale. Under the 48-hour week plan, the labor cost would go up a maximum of $80 a day for a total added cost of about $2,400. And this would only hike cost of the well to the operator — with compensating footage rates—to $62,400.

One contractor who has been concerned with the loss of qualified crewmen said contractors have realized for 18 months they would have to raise wages and have decided that "now is the time to do it.

"The men are under paid, and we need to attract more people to the business—we're running out of folks. We just can't get the class of men we used to get."

He considered the move as a healthy one but cautioned that, unless all the contractors go along, it may be necessary to cut back. In other words, there must be general consent one way or the other. If a large number hold back on the increase, they will get the drilling jobs; but if this number is small, they won't be able to hire qualified men to man the rigs.

How Contractors Can Meet Shorter Work Week

For a five-man crew, contractor could hire three relief men, who would swing through all work tours. Only two relief men would be needed for four-man crew.

	MORNING TOUR	DAY TOUR	EVENING TOUR
A relieves driller on	Monday	Friday	Wednesday
A relieves derrickman on	Tuesday	Saturday	Thursday
B relieves floorman on	Wednesday	Sunday	Friday
B relieves other floorman on	Thursday	Monday	Saturday
C relieves motorman on	Friday	Tuesday	Sunday*

*Relief man C can be used on another rig or assigned other work on his three remaining work tours.

"Depletion, No; Subsidy, Si"—Says Caplin

AN UPROAR in Texas producing circles arose last week following a public suggestion by a high government official that oil's depletion allowance should be dropped in favor of direct federal subsidies.

The proposal was made by Mortimer Caplin, commissioner, of the Internal Revenue Service, August 26 in a newspaper interview between planes at Dallas' Love Field.

"My own feeling is that if the industry is sick, if it needs assistance, then it should be provided in the form of subsidies arranged on a year-to-year basis. Definitely it shouldn't stem from terms of the nation's tax laws. That's the trouble with the code we have now; it's too loaded down with provisions for a multitude of individual cases," the commissioner said.

Caplin, a former law professor from the University of Virginia and appointee of President Kennedy in February, emphasized that these views are his own.

But Texas producers aren't entirely convinced. They are speculating that the Caplin statement might have been planned deliberately as trial balloon by the Kennedy administration.

The Caplin proposal drew an immediate hot blast from Albert Fay, Houston independent oil operator and Texas national Republican committeeman. Fay branded it as "ridiculous, irresponsible, and completely socialistic."

"As it stands today, the industry, like many other segments of our economy, is crippled by too much interference by the federal Government."

"Subsidies, and the resulting added government controls, would really wreck it (the industry), as it has, for instance, the railroads where subsidies have now placed managerial decisions in the hands of bureaucrats."

Fay said Caplin's statement should bring home to all members of the petroleum industry "the obvious fact that the Kennedy administration has no understanding of the problems of the industry."

"Texas has suffered loss of revenue and decline in employment because this industry has been constantly threatened by the Democratic Congress with further crippling tax and regulatory legislation.

"With the threat of war increasing each day, it is inconceivable that the present administration would ask Congress to deal a death blow to a critical defense industry."

Congress must do it . . . Elaborating on his proposal, Caplin in his Dallas statement complained that "we need a simpler law, one that removes as many of the gimmicks as possible." That, he said, is easier to say than to accomplish.

The revenue commissioner said any such change as that proposed would have to be recommended by the Secretary of the Treasury and then passed by Congress.

One of his most vexing problems, Caplin declared, is the $25 billion dollar gap between the nation's actual earned income and what is reported. This he said, is costing the Government about $4.9 billion in taxes each year.

"We hope," he said, "to correct much of this by closing many of the tax loopholes that now exist."

Pure Pushes "Total Marketing" in Its Big

PURE Oil Co. is blazing new merchandising trails that may very well be setting some trends for other petroleum marketers.

In the last few weeks, Pure has:

. . . Opened its second "big one" service center. This one, in Lakeland, Fla., is an expansion of an idea that first proved successful at Greensboro, N. C.

. . . Started a Montgomery Ward catalog agency at three of its larger stations as another experiment in merchandising.

In addition, Pure is planning other super service centers in its marketing area and will soon undertake more merchandising schemes centered around petroleum products and service to the automobile.

NEW merchandising device is exemplified by Montgomery Ward catalog agency at Pure outlet in Palatine, Ill. Station gets commission from catalog sales, but main aim is to increase flow of traffic to outlet.

Lakeland approach . . . The Lakeland station illustrates Pure's "total market concept" in which a super station creates a new image for a marketing area and boosts business at other outlets.

Pure Marketing Vice President Harry I. Moir says the Lakeland super station will boost two existing stations and one new station yet to be built. Existing truck stops are not involved in the experiment because they are not believed competitive with other service stations.

In reorganizing its "total market" in Lakeland, Pure also has closed two existing outlets and is bypassing its bulk plant.

Moir says Pure hopes the Lakeland "big one" will demonstrate the distance from which a station of this kind can draw customers. It also will test the effectiveness of various advertising media, the pulling power of special promotions and premium items, and may establish profitability standards for this type of operation.

Pure plans at the same time to streamline its distribution system in Lakeland through elimination of costly, low-potential outlets. Another aim: To redevelop the market with modern, high-potential stations capable of taking advantage of a special, aggressive merchandising program.

Pure's first experiment in this type of station was at Greensboro, where six marginal outlets were closed prior to opening the Service City. Since then Pure has built three new stations in the city.

PURE SERVICE CITY in Lakeland, Fla., furthers a new concept in super stations based on service plus promotion.

New Stations

The aim at Greensboro was to have the super station lend prestige and glamor to the existing stations with a consequential rise in total volume. The station has boosted business for other outlets but so far has not yet reached its own estimated potential.

The facilities . . . The Lakeland Service City is larger than the Greensboro super station and has a more ambitious program.

It is built on a 230-by-130-ft. site fronting on Lakeland's primary street in the major residential area. The air-conditioned station features a sales room and customer lounge, private office for the manager, four service bays, a tire display bay, and a refreshment area.

Other unusual features include:

. . . A floating canopy extending from the building toward the street and covering two large service islands. The canopy is made of precast prestressed, reinforced concrete; and at first glance it does not appear to have any connection with its supports.

. . . An eyecatching circular screen of precast concrete enclosing the refreshment area. This is located near the salesroom and is provided with parking space away from normal traffic.

. . . Air-conditioned rest rooms inside the building with home-type built-in lavoratories, and wall surfaces of mosaic tile and vinyl in unusual color schemes.

. . . Special landscaping adding to the beauty of the station. A decorative wall serves as a perimeter fence against which palms and Florida shrubbery are planted.

The program . . . An aggressive merchandising program is already paying off at Lakeland.

The Service City handles tires, a complete line of accessories, and minor repairs up to but not including heavy engine work. The manager and employes are salaried.

A minimum of fanfare accompanied the opening. A small special section in the local newspaper introduced the station and its services. Since then, a series of newspaper advertisements have plugged special bargain deals in repairs, wheel work, or tires.

There have been no give-aways or special premiums. Only promotions along this line have been issuance of trading stamps, honoring of all major-company credit cards for a limited time, and free pickup and delivery anywhere in town.

The volume of business in services, TBA, and gasoline has been excellent, according to Pure executives.

Pure already has plans for similar Service City projects. Others will be located at Miami Beach and in Georgia, Ohio, and Chicago.

New merchandising . . . The Montgomery Ward tie-up may be expanded into other areas.

At the moment Pure has installed catalog agencies at stations in Palatine near Chicago, in Fox Lake, Ill., and in the Greensboro Service City. A fourth agency may be opened later this year at Lakeland.

Pure has other merchandising tie-ins in the planning stage. A fancy new station in Milwaukee will be built around a giant quick-car-wash operation. At other locations plans are being made to tie a service station into a coin-operated dry-cleaning store, into a new shopping center, and into a discount house.

Pure marketing officials are committed to a policy of upgrading the company's facilities to provide larger stations which handle a varied line of merchandise and are able to profit from a strong promotional campaign.

Gas-Pipeline Projects Mount

- FPC sets record in approving new projects. Its score for fiscal '61: 6,000 miles of new lines, 330,000 hp.

A RECORD total of natural-gas-transmission facilities was authorized by the Federal Power Commission in the 1961 fiscal year, which ended June 30. The value: $852,-168,000.

By comparison, the dollar value of projects approved in 1945 was $34.1 million; in 1950, $487.2 million; in 1955, $465.3 million; and in 1960, $846.7 million.

The 1961 facilities include about 6,000 miles of pipeline and addition of 330,000 hp. in compressor capacity. This will add about 4 billion cubic feet daily to delivery capacity of the nation's transmission systems.

The FPC notes, however, that a substantial number of certificates issued do not actually add to the main-line, daily-delivery capacity or sales capacity of the individual pipeline systems.

Instead, the certificates increase the companies' ability to receive additional gas from producing areas, to inject or withdraw gas in storage fields near market areas, or to deliver gas through additional sales laterals and other facilities.

FPC stresses particularly the continuing development and operation of underground-storage facilities close to ultimate markets. This, it says, enables a pipeline system to provide better service in meeting peak demands without the necessity of increasing pipeline capacity.

Major projects . . . The largest certificate authorization during the 12-month period covered by the report was issued in August 1960, to Pacific Gas Transmission Co. It authorized a 614-mile pipeline system from the U. S.-Canadian border through Idaho, Washington, and Oregon to the California State line. The project, estimated to cost almost $130 million, is designed to import 570 million cubic feet daily from Canada, primarily for sale in California.

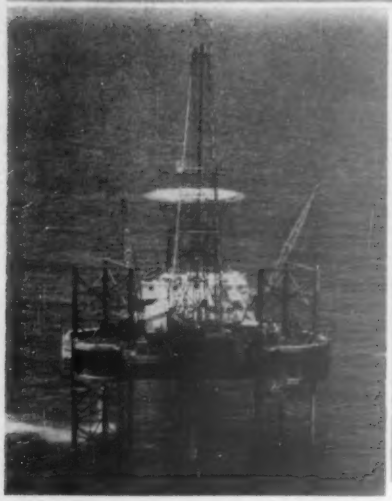
Other major projects:

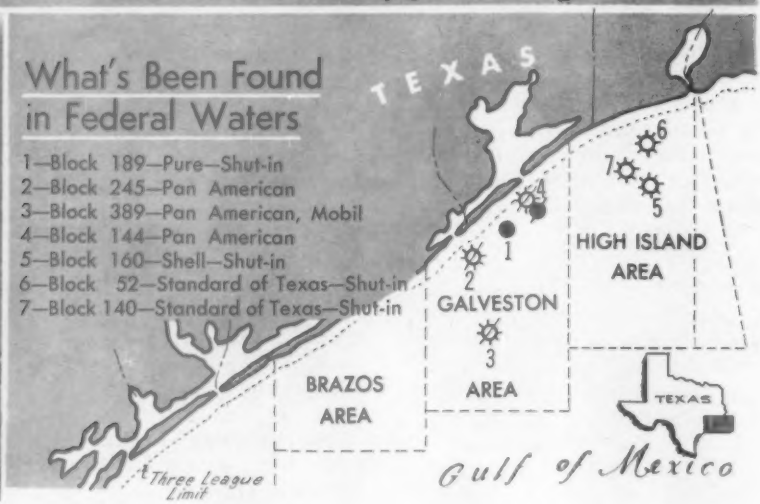
. . . Natural Gas Pipeline Co. of America, construction of 511 miles of main-line loops from Texas to Illinois, and other facilities. Total: $62.6 million.

. . . Colorado Interstate Gas Co., 515 miles of new transmission and main-line loop pipelines from Texas to Utah, and other facilities. Estimated cost: almost $100 million.

. . . El Paso Natural Gas Co., 395 miles of 34-in. line from a connection with Colorado Interstate Gas Co. in Utah to a point near Las Vegas. Estimated cost: $60 million.

Federal Waters off Texas . . . *Disappointing So Far*





$100 Million Spent—Little to Show

AT A TIME when depletion is under attack in Washington, several of the major domestic producers could pull the files of their operations in federal waters off Texas and make a pretty fair case in defense of their cause.

The oil industry has spent at least $100 million to explore for oil and gas beyond the 3-league limit in offshore Texas.

How many wells are producing there now?

None.

This is the industry's record after paying out $67.5 million for federal leases in the past 7 years, drilling 43 wells at an estimated cost of $22 million, and spending many millions more on lease rentals, seismic work, and other activities in the search for production.

The search in federal waters—seaward of the 3-league line—has not been entirely fruitless. Of the expensive offshore wildcats drilled, eight have found oil or gas in some quantity. But the quantity has been so small it cannot be produced commercially. It serves only to whet the interest of the drillers.

Within the 3-league limit of state waters, the record is better. But "success" is hardly the term to describe it. There are nine producing fields in this area, all but one of them small as fields go. Some are of the one-well variety. There is nothing comparable to the lush production along the Gulf Coast just a few miles inland.

Whose money . . . Three times since 1954 the Interior Department has sold leases in offshore Texas.

The 1954 sale brought in $23.4 million in bonus money for 67,148 acres. The second sale, in 1955, collected $8.4 million for 149,760 acres. The last sale, in February 1960, was the largest in dollar value—$35.7 million for 240,480 acres.

These figures add up to $67.5 million for 457,388 acres.

Shell Oil Co. has laid out, by far, the heaviest sums for the right to drill in offshore Texas. Its bonus payments total $28.5 million for 230,000 acres.

Standard Oil Co. of Texas, a subsidiary of Standard of California, has paid $10.2 million for 17,280 acres. The only others which have spent sizable sums in bonus money are Atlantic and Tidewater jointly, $6.2 million for 25,388 acres, and Phillips Petroleum, $5 million for 20,160 acres.

Shell and Stanotex also have been the leading drillers. Shell has tried 12 times on its federal leases and Stanotex has drilled 11 holes. In Shell's case, six wells have been drilled jointly with others — two with Continental, two with Mobil, and two with Phillips.

Pure Oil has tried five times, Pan American four times, Atlantic, Continental, and Humble three times each, and Mobil once. Pan American and Mobil have drilled one well jointly.

What they found . . . Of the eight wildcats which found some oil or gas, four have been abandoned and four are shut-in as noncommercial at this time.

Most are located in the northern sector of the Texas Gulf Coast near Galveston.

Pure Oil produced 21,119 bbl. from a Block 189 well about 12 miles southeast of Galveston Island and then shut it in. Pan American abandoned production in Block 144 about 12 miles to the northeast of the Pure well and sold its interest to Texas Eastern in a Block 245 well about 12 miles to the southwest. The Block 245 well subsequently was abandoned.

Stanotex has shut-in wells in Blocks 52 and 140 farther to the north and east, while Mobil has abandoned a gas well in Block 389, some 25 miles offshore from Brazoria County. The Mobil well was drilled originally with Pan American.

Shell, currently the most active among the offshore drillers, completed a gas well this summer in Block 160, about 40 miles southeast of Galveston. Drilled jointly with Phillips, the well tested marginally at 4 million cubic feet of gas daily with 5 bbl. of condensate per million. Shell considers the well of little value because of its great distance from shore.

Last month Shell drilled a dry hole to 13,608 ft. in Block 161. The Vinegarroon, which did the work, has now moved back to Block 160 for a 9,000 ft. test. It is currently drilling below 8,200 ft.

Where's the oil? . . . Geologists haven't given up yet on offshore Texas.

They contend that a showing of 43 wells is hardly sufficient to prove or disprove the oil potential of so vast an area.

In contrast to the rich production off Louisiana, where the Mississippi River is the dominant factor in distributing oil sands, the Texas offshore waters cover sediments deposited by small rivers and open waters.

This environment is the same as that for onshore Texas except for a difference in age. Although production is lush in the Oligocene (Frio) trend onshore, the companies have yet to make comparable finds in the Miocene offshore.

Salt domes dot the offshore area, but none has proved to be a Sour Lake or Barbers Hill.

Geologists believed originally there ought to be a "repeat performance" in offshore Texas, just as there had been off Louisiana. Some still hold this belief.

"We haven't lost yet," one geologist said last week. "It's just been harder to find oil than we thought it would be."

What next? . . . Interior's Bureau of Land Management is expected to hold another offshore lease sale in the spring of 1962.

Whether there will be Texas tracts in the sale depends on the operators. If they nominate acreage, it probably will be included.

At a recent sale of tracts within state waters, Gulf Oil Corp. paid $670,000 for a 1,440-acre tract off Padre Island. Other tracts also went for good prices, while some had no bidders at all.

Watching WASHINGTON

Clyde La Motte

• Swidler won't abandon area-pricing approach soon . . .

JOSEPH C. Swidler isn't going to close the door on the area-pricing approach. At least not until he has had time to inspect it closely for salvageable parts.

Swidler, who became chairman of the Federal Power Commission last Friday, is acutely aware that regulation of producer prices is the toughest problem the commission faces. Thus he doesn't want to rule out any possibility, particularly one on which much time and effort have already been spent by the commission and the industry.

What he may come up with is a combination approach. This would include exemption of small producers (as advocated by the administration)) with the remaining producers regulated under a modified version of area-wide pricing.

The obvious reason would be to thin out the number of cases the commission would have to handle and to provide some system for regulating those who remained.

Swidler—who hasn't yet committed himself to any specific approach—has said that if the area proceedings are to be continued, the handling of the cases must be as effective as possible and the commission must provide as much specific guidance as possible.

One of the often-heard complaints from the industry has been that FPC has not spelled out what it wants to do and how it plans to do it. This leaves everyone in the dark as to the next steps.

• His first problem: Getting a majority behind him . . .

IT SHOULD be borne in mind that the chairman of FPC cannot make much progress in any direction unless he has a majority with him.

For that reason, it is not likely that Swidler will outline many specific targets until he has had time to discuss aims and approaches with the other members of the commission. His immediate task, therefore, is getting support from at least a majority of the commission on any major moves he wishes to make.

There's a preponderance of new members on the commission, and it will take time for each newcomer to familiarize himself with the various issues. Until that happens, the shape of things to come must remain somewhat fuzzy.

An observer gets the feeling, however, that this new group will be intent on acting promptly in an allout effort to get results. Thus, the months ahead will be telltale ones.

• Watch for clues in Houston speech this month . . .

FIRST tipoff about the direction Swidler hopes to take may come September 19, when he speaks at the Houston meeting of the Independent Natural Gas Association of America.

This will be Swidler's first major speech after becoming chairman, and he knows he will be expected to say more than hello. Yet he will have to hurry if he is to have all the answers by that date.

Since coming to the commission 2 months ago, Swidler has been busy preparing himself for the chairmanship. He has been moving at a terrific clip, seeking to acquaint himself with the organization, the staff, the industry, and the issues.

Aluminum Drill Pipe Passes 100,000 ft.

- **Shell says it is more than satisfied with the industry's first aluminum drill string.**
- **7,000-ft. rig drilled to 11,500 ft. with light string and there have been no serious problems.**

THE industry's first aluminum drill-pipe string has just completed its first 100,000 ft. of hole and begins the second 100,000 with an excellent performance record.

The string has been in service for Shell Oil Co. on its trailer-mounted Rig 25 in South Texas.

According to Shell, its string indicates to its drilling engineers that "the aluminum pipe is more than satisfactory for oil-industry drilling needs, especially when some of the cost-cutting factors are considered."

In Shell, in Reynolds Metals Co. which rolled the pipe, and in Reed Roller Bit Co. which supplied the steel tool joints, consensus about the first 100,000 ft. of drilling is this: No especially troublesome problems.

The pipe has been handled in the same way that steel drill pipe would be; yet, there have been no damaging tong and slip marks. There has been no appreciable abrasion of the outside surface as a result of contact with hole walls. There has been no corrosion from the muds used. There have been no twistoffs.

Only unusual problem was a slight eroding of the inside diameter of the aluminum pipe near the tool joints. Cause of this erosion was turbulence of the drilling-mud flow through the joints. Source of this turbulence and resulting erosion has been eliminated by redesigning the tool joint.

On sale in '62 . . . Officials of Reynolds observed the 100,000-ft. mark by announcing they hope to get the aluminum drill pipe into commercial production by next summer.

In the "introductory period," Reynolds is selling the 4½-in. strings for $9.20 per foot when equipped with non-hard-banded steel tool joints. Steel 4½-in. pipe with the same style tool joints sells for just over $6 per foot.

ALUMINUM drill pipe racked on a Shell Oil Co. location near Yorktown, Tex. String is now on its second 100,000 ft. of hole.

Reynolds makes two points about the price of aluminum drill pipe:

. . . **It has a salvage** (junk) value of $1.60 per foot.

. . . **It should be cheaper** to operate since it extends the depth capacity of the draw works and derrick.

Advantages . . . Aluminum pipe's advantage to Shell is apparent in the drilling depths reached by Rig 25.

Originally designed for 7,000-ft. work with steel pipe, the rig has drilled to 11,500 ft. with aluminum pipe. Thus, Shell says, "the lighter weight of the string has increased the competitive depth range of the rig by more than 45%. The company goes so far as to say that aluminum alloy drill pipe "may supplant or supplement conventional steel drill pipe on company rigs, if the aluminum string continues to pass field tests currently being conducted."

Besides uprating the rig, Shell engineers see advantages in "cheaper transportation costs as more joints can be handled per truck load without increasing the load weight. The joints also come in more exact lengths, varying less than 0.04 ft. per joint compared to a variation of as much as 2 ft. per joint of steel pipe. This results in floor-time and other savings."

Original hopes about better mud hydraulics through the aluminum pipe have been borne out in drilling. Even after 100,000 ft. of hole, it takes less pressure to pump through the aluminum pipe than through steel pipe even though the aluminum pipe has a slightly smaller inside diameter.

Tool joints revised . . . The Shell string of aluminum pipe is fitted with screw-on steel tool joints almost identical in dimensions to those used on steel pipe strings.

Internal surface of these joints is not smooth, there being a discontinuity in three places: the two areas where the aluminum pipe screws into the tool joint and the one area where pin and box of the tool joint

are made up. These discontinuities cause the turbulence of mud flow which resulted in erosion of neighboring aluminum areas.

Shell overcame this condition by placing small plastic "boots" in each joint. These "boots" will not be necessary in other strings of aluminum drill pipe. Reed has redesigned the tool joints to decrease stand-off distances; as a result, inside surface is smoother and mud can flow through without turbulence.

Two strings of aluminum drill pipe with the new tool joints have already been put in service, one for R. W. Rine Drilling Co. in Kansas and one for Prime Drilling Co. in Oklahoma.

On three important points about aluminum pipe, Shell men are apparently satisfied. A company publication says:

. . . **"The string** may be handled in the same manner as steel pipe, both on the rig and in hauling."

. . . **"Conventional fishing** tools and techniques may be employed without modification."

. . . **"In hydrogen-sulfide wells,** the need for a special inhibitor when using aluminum is reduced."

But, Shell observes:

. . . **Mud** with a low alkaline rating must be used with the pipe.

. . . **Common acid inhibitors** containing arsenic compounds cannot be used because these arsenic compounds react with aluminum to form a deadly gas—arsene gas.

Reynolds engineers place the ceiling on mud alkalinity at a pH rating of 11.0. In its South Texas test wells, Shell has been using a gyp mud of lower pH.

Both Shell and Reynolds say that the tensile strength and fatigue resistance of the aluminum pipe equal or exceed those of Grade E steel pipe normally used in drilling. Hanging in a 10-lb. mud, a string of 4½-in. aluminum drill pipe weighs less than half as much as an identical length of 4½-in. steel pipe.

Texas Drillers Hit By New Tax

- Licenses now required for trailer-borne rigs. Extra cost: About $500 per unit. Contractors will seek relief.

TEXAS drilling contractors are reeling from a sudden, unexpected tax blow from the Texas Legislature and highway department.

The state highway department in the past couple of weeks has started refusing overweight permits for trailer-mounted rigs using Texas highways unless the trailers are licensed.

Previously, the department issued these permits routinely with no license requirement.

One contractor estimated that the required licenses will cost about $500 for each unit.

He and others immediately raised a howl, terming the action unjust and discriminatory in that the rigs are on the highways "only a relatively few times each year."

How it happened . . . The highway department action is based on the addition by the legislature of one word in Texas' vehicle registration statutes.

Trailer-mounted rigs up to last month had been exempt from licensing requirements under a general clause exempting "construction machinery."

During the last special session, however, the legislature amended this clause to read "road construction machinery."

This left contractors out on a limb. And as things stand now, the owner of any trailer-mounted rig caught using state highways without license is subject to arrest.

What makes it still worse is that there is some question that such action by the state also makes the contractor subject to payment of the federal highway use tax.

Action expected soon . . . Contractors will not turn the other cheek.

A meeting on this situation was held in Wichita Falls August 29 by contractors and operators.

Best bet now is that a delegation, complete with attorneys, will be heading for Austin soon for conferences with Will Wilson, state attorney general, and officials of the highway department. Head of that body is D. C. Greer, state highway engineer.

Utility Plans New Natural-Gas Line In East Texas

A BIG new intrastate gas line is in the works for East Texas.

The line will carry gas for Texas Power & Light Co. and will be built and operated by Bi-Stone Fuel Co., Corsicana, Tex.

It will originate in the Bethel producing area in Anderson County, East Texas, and move gas to power generating plants in the Sherman-McKinney area of North Texas.

Pipe for the line has already been ordered and right-of-way work has started.

The project includes about 100 miles of 16-in. main line from the Bethel area to Merit in Hunt County plus 75 miles of 10, 8, and 6-in. laterals.

From Merit, the system will branch to the north and west. One 30-mile 10-in. lateral will extend straight north to serve a new TP&L generating plant now under construction at Savoy, in Fannin County a few miles west of Bonham.

A second 30-mile 10-in. lateral will run due west from Merit to serve TP&L generating facilities in the McKinney-Denton area north of Dallas.

Gas supply? . . . There is no definite information available as to where TP&L has found gas reserves sufficient to supply a line of this size. There isn't much uncommitted gas available in the area surrounding the southern terminus of the line.

Normally a line of this size, with some compression, could handle between 75,000 and 100,000 M.c.f.d.

There is some uncommitted gas owned by Texaco Inc. in the Bethel dome area of Anderson County and some more owned by Sanders and Murchison, Athens independent, in the Tri-Cities field of Henderson County.

These are within easy reach of the proposed line and it is reported that the new project has sewed these up. But available reserves in both fields are relatively small.

In addition, there is substantial surplus production in fields in the area served by Bi-Stone lines.

O'Brien Will Head Office of Oil and Gas

• Former TIPRO president chosen for Interior post which has been open for months. New director's a strong backer of oil-import-control program.

JEROME J. (Jerry) O'Brien, a California-Texas oil man who is well known in producer circles, is to be the new director of Interior Department's Office of Oil and Gas.

The announcement will be made this week by Interior Secretary Stewart L. Udall.

O'Brien, 54, is a former president of the Texas Independent Producers and Royalty Owners Association (1957-1958) and a former member of several committees of the Independent Petroleum Association of America.

He was also a director of Mid-Continent Oil and Gas Association, and has appeared before several congressional committees during hearings on percentage depletion and import controls.

It is understood that O'Brien helped draft proposed legislation in 1958 that would have provided for governmental auctioning of import quotas.

His career in recent years has been with the Monterey Oil Co. of Los Angeles, although he is now living in Midland as an area superintendent for Humble Oil & Refining Co.—which bought Monterey last April.

He was president of Monterey Exploration Co. from 1951 to 1955, when that firm was merged with the parent company, Monterey Oil Co. He then became vice president of the latter company, and manager of its Mid-Continent division.

Background . . . O'Brien was born in Nebraska in 1906, the youngest of nine children. He attended high school and 1 year of college there before going to California to attend the University of Southern California at Los Angeles.

It was while he was at UCLA that he got his first oil experience. He worked as a service-station manager for Standard Oil Co. of California while he was in school.

After getting his bachelor of arts degree at UCLA in 1932, he studied petroleum engineering for 2 years at the University of Southern California.

Jerome J. O'Brien
. . . favors import controls.

He had some fill-in jobs with a mining company and as a surveyor before he landed a job in 1935 with Sunset Oil Co. as a rotary helper at Huntington Beach.

He continued with Sunset until 1941, and was chief geologist when he resigned to go into partnership with George H. McCarthy, forming the Shamrock Drilling Co. in Los Angeles. A couple of years later the partnership became a corporation—on St. Patrick's Day, naturally.

In 1948, O'Brien went to Texas as manager of Mid-Continent operations for Jergins Oil Co., although he retained part ownership of Shamrock until 1952.

He was with Jergins and its successor, Monterey Exploration Co., and Monterey Oil Co. from that time on.

His views . . . O'Brien is a strong advocate of the oil-import-control program. He thinks it has been a life-saver for independent producers, although he fears the controls have not been entirely successful.

O'Brien also has long been an advocate of decontrol of natural-gas producers from direct federal controls of a utility type.

He does not see anything wrong with the proposed fuels-policy study, "if it is fair and impartial." In fact, the oil industry may benefit from such a study, he says.

His assignment . . . Interior officials, including Secretary Udall and Assistant Secretary John M. Kelly, want to upgrade the Office of Oil and Gas. Therefore, O'Brien will be moving into the job as director at a time when renewed emphasis is being put on the agency.

Both Udall and Kelly feel that OOG should be the focal point for government oil operations, serving not only as a link with the industry but as a link between various government departments.

Kelly also thinks that OOG needs to be an increasingly important source of information for facts and figures on international oil conditions, so it can be of greater use to government oil officials in handling international oil problems.

The directorship has been open

PROCESSING

An analysis of the relationship between commercial motor fuels and engine performance is the basis of "Interpretation of Motor Fuel Survey Data," a book recently published by the Natural Gas Processing Association. Copies are available at $3 each from NGPA, 421 Kennedy Building, Tulsa.

Gas-processing facilities are being built in Jefferson County, Texas, by Port Gas Processing Co., a wholly owned subsidiary of Hudson Gas & Oil Corp. The 150,000 M.c.f.d. plant is expected to be completed in the early fall by the Early Co., Shreveport, at a cost of $5 million.

Purchase of National Plastic Products Co. has been announced by Enjay Chemical Co. and J. P. Ste-

since Capt. M. V. Carson resigned April 1. Frederick Lott, an assistant director under Carson, has been acting director.

Carson, who also retired from the Navy this year, is now with Sinclair Oil Corp. He had held the directorship since April 1958.

Two Gallons of Fuel Melt Ton of Snow in Street-Clearing Test

A NEW market for fuel oil—firing mobile snow melters to clear city streets after winter storms—is being offered by Esso Research and Engineering Co.

The machine last week disposed of 50 tons of shaved ice in a little more than 30 minutes in a demonstration that impressed New York City officials who are expected to use it this winter.

The mobile version of the equipment is based on a stationary model developed by Esso Research & Engineering and Thermal Research & Engineering Corp., Conshohocken, Pa. The stationary model, rated at 25 tons per hour, was tested during the past two winters at La Guardia Marine Air Terminal in New York.

It cleared the equivalent of 110 tons of snow from a 110,000-sq.-ft. area in just over 4 hours. Fuel cost was $7.50 an hour. Esso said the mobile melter saved $50 per hour over truck hauling of the snow and did the job in half the time.

It is estimated that 30 to 40 mobile snow melters could quickly clear major New York City arteries after a heavy storm. The Esso-Thermal machine, costing $35,000, can melt in 1 hour an amount of snow equal to 40 truck loads.

Fuel oil is piped to the burner along with air from a blower. Resulting hot combustion gases jet into a water tank to agitate and heat the water. A front-end loader dumps snow into the tank where it melts almost instantly and drains into the sewer system at 300 gal. per minute.

This so-called submerged-combustion process utilizes almost 98% of the oil's heat content, making possible low operating costs. Two gallons of fuel oil costing around 30 cents will melt a ton of snow. Gasoline consumption by engines to drive the blow and accessories is 5 gal. per hour.

Shell Will Try Another Nevada Wildcat

A NEW wildcat location has been staked in Nye County, Nevada, by Shell Oil Co., which has had an off-and-on exploration program in Nevada since bringing in the state's first commercial oil well in 1954.

Shell's next try will be 7 miles southeast of Eagle Springs field in Sec. 4-7n-57e. The wildcat, tagged "Well No. 54-4," will go to 7,500 ft.

The 54-4 is about 3 miles east of a 10,185-ft. dry hole drilled by Shell and about 4 miles southwest of a 6,036-ft. duster.

During Shell's long campaign to establish Nevada as a major producing area, the company has completed four producing wells in Eagle Springs field and eight dry holes in Railroad Valley. Shell's latest completion was a dry hole 1,500 ft. northeast of Eagle Springs field.

Shell has been producing two wells in the field this year with the field's output averaging about 450 bbl. daily.

Suntide Petroleum Co., a subsidiary of Sunray Mid-Continent Oil Co., entered the Nevada exploration picture earlier this year (OGJ, Apr. 17, p. 155), but the company's first effort was a dry hole in White Pines County about 40 miles north of Eagle Springs. Suntide has not revealed any additional drilling plans in the state.

BRIEFS...

vens & Co., Inc., a prominent textile company. Enjay, Humble's chemical marketing division, and Stevens have been conducting joint research toward manufacture and utilization of textile fibers from polypropylene. National Plastic is an experienced fiber manufacturer.

New hydrocarbon resin to be used in paints, varnishes, floor tile, and other products will be produced in a plant being built by Amoco Chemicals Corp. at Texas City, Tex., south of the American Oil Co. refinery. Completion is set for early fall.

Premium and regular gasoline research octane numbers held steady in August, according to the monthly survey of antiknock quality by Ethyl Corp. However, premium average of 99.2 was 0.1 RON below a year ago, and the motor octane of 89.9 was 0.1 below July but 0.1 above August of 1960. Regular at 92.7 RON was 0.1 above a year ago, while the motor octane of 84.5 was 0.1 above July but 0.1 below a year ago.

New chloromethane unit is now in commercial production at Diamond Alkali's Belle, W. Va., plant. Products include methyl chloride, methylene chloride, chloroform, and muriatic acid.

A naphthalene plant with capacity of 100 million pounds per year will be built by Texaco Inc. at its Port Arthur, Tex., refinery. Described as one of the largest in the world for making petroleum-derived naphthalene, the plant will go on stream no later than the beginning of 1963.

Naphthalene, mostly obtained from coal tar at present, is an important raw material for making phthalic anhydride for the production of flexible plastic films, polyester resins, alkyd paints, surface coatings, and dyestuffs.

Facilities for producing 30 million pounds per year of phthalic anhydride will be built at the Perth Amboy, N. J., refinery of California Oil by the Oronite Division of the California Chemical Co. Construction will begin immediately.

A hydrodealkylation unit having an annual capacity of 17 million gallons of benzene has gone on stream at Crown Central Petroleum Corp.'s refinery near Houston. The Houdry Detol plant, engineered and constructed by Catalytic Construction Co., produces benzene by dealkylating toluene, xylenes, mixtures of the two, or alkyl benzene concentrates.

Computers Teach Oil Management to Engineers

- Novel "decision lab" acquaints Dallas PE's with industry problems.

OIL management is gaining new respect among petroleum engineers in Dallas.

At present 150 Dallas engineers are learning how varied the problems are which confront an oil-company manager.

And, in the process, they are equipping themselves to assume a management role some day.

The engineers are members of the Dallas section of the AIME's Society of Petroleum Engineers. They are participating in a management-study course developed by their section in cooperation with International Business Machines and Southern Methodist University.

This "management decision laboratory," believed to be the first of its kind in the oil business, will keep the engineers busy for months.

AN IBM 650 computer sizes up executive talents of petroleum engineers* taking part in a novel "management decision laboratory" in Dallas.

Computers help teach . . . The Dallas engineers completed the first of two phases in the course last March. This 2-month session covered management generally, with emphasis on manufacturing and marketing. It was conducted with the help of IBM specialists and equipment.

The second session at SMU, dealing specifically with the fine points of running an integrated oil company, started on the tail of the first and will run through November.

With aid from guest lecturers, they are using a computer-simulated version of the oil industry as a tool to apply their skill in making oil-management decisions.

The computer "situations" contain such variables as the over-all U. S. economy with its cyclical business fluctuations. And the engineer-students must make decisions on buying new leases, exploring and drilling, financing, refinery process rates and capacities, marketing policies, and prices.

Some win, some lose . . . In the first phase of the course, the engineers practiced management as "heads" of theoretical manufacturing companies.

IBM computers, set up with built-in mathematical economies, compared the talents of rival teams of engineers engaged in selling the same product.

Teams had to decide how much to spend on research and market studies, how and where to acquire raw material, how much plant was needed, how and where to market, and so on.

In one instance, a fictional company went bankrupt in a little over a "year" because the team running it spent too much on research.

A competitor made a $2,000,000 killing during the same period by balancing research expenditures against those for manufacturing, marketing, and other functions.

Engineers enthusiastic . . . Proof of the engineers' enthusiasm for the game is the fact that they have dipped into their own pockets to buy additional computer time.

T. L. Kennerly, chairman of the Dallas section study group which sponsors the course, says it has attracted more interest than any SPE study course in history.

The age of most players, Kennerly points out, is considered ideal for oil-company executive material,

*T. A. Pollard, Mobil Oil Co., left, T. L. Kennerly and T. L. Carlson, both of Core Laboratories, Inc., all members of AIME's Society of Petroleum Engineers which sponsors course; Alan P. Hakes, IBM representative (seated).

INDUSTRY

Texas' new tax bill has become law without Gov. Price Daniel's signature. Most of the new revenue will come from a general 2% sales tax. The only new direct tax on the oil and gas industry is a severance beneficiary levy on gas. As watered down by amendments, it would cost the industry and estimated $3,000,000 a year.

Kansas allowable for September remains at 300,000 bbl. daily. Purchaser nominations totaled 299,039 bbl. daily, an increase of 5,631 bbl. over August.

Secondary recovery for Aneth unit, San Juan County, Utah, has been approved by Utah's Oil and Gas Conservation Commission. Operated by Texaco, the unit is one of the largest segments of Greater

and, he says, "these games could be instrumental in breeding a better brand of oil leader for the complicated years ahead."

Drilling Start Near for First Deep Test in Arctic Islands

THE first deep-drilling test in the promising Canadian Arctic islands is expected to get under way this month.

A Danish ship, the "Thora Dan," arrived at Melville Island August 20 with about 3,500 tons of equipment for the test.

Dome Petroleum, Ltd., project operator, says the drilling rig and other supplies are being put ashore on the southern coast of Melville Island near Winter Harbor. The material will be moved to the drill site when unloading operations are completed.

A Canadian Government ice breaker helped the "Thora Dan" reach the island.

Estimated cost of the first well is $1 million. Target depth of the well, designed to test Middle Devonian and Silurian-Ordovician formations, is 10,000 ft. (OGJ, July 3, p. 76).

Location is on a 100,000-acre block farmed out by Dome and its affiliate, Provo Gas Producers, Ltd. They jointly retain a 15% net carried interest in the well and farmout acreage, in addition to direct participation in the well.

Altogether, 13 oil companies and mining groups are taking part in the venture and each of the participants is sharing a percentage of the costs.

Runs Leap to All-Time Peak

REFINERY runs hit an all-time high during the week that ended August 25: Daily average was 8,558,000 bbl.

This is the first week in oil history with runs exceeding 8.5 million barrels daily.

It was the third runs record this year. The previous all-time high was established during the week that ended March 3, when the average was 8,474,000 bbl. daily. And earlier than that—during the week ending January 27—runs topped 8.4 million barrels daily for the first time.

The new record for the country as a whole was set without any new marks being reached in any of the major refining districts.

Distillate stocks increased 6,335,000 bbl. in the week ending August 25. Additions to distillate storage were made at the rate of 905,000 bbl. daily.

Since distillate production for the week averaged 1,999,000 bbl. daily, this means refiners put 45% of the week's distillate production in storage.

Here are the all-time runs records for the large districts:

District—	Barrels daily	Week ending:
East Coast	1,268,000	April 11, 1958
Indiana, Illinois, Kentucky	1,615,000	January 8, 1960
Oklahoma, Kansas, Missouri	796,000	July 28, 1961
Texas Gulf	2,077,000	June 1, 1956 and March 3, 1961
Louisiana Gulf	755,000	June 5, 1959
West Coast	1,342,000	June 2, 1961

BRIEFS . . .

Aneth pool. Commission action is expected later this year on applications for water floods in Desert Creek formation of three other Greater Aneth units—Ratherford, McElmo Creek, and White Mesa.

Arizona Oil and Gas Commission Chairman Anthony T. Deddens has resigned to become judge of Cochise County, Arizona, Superior Court. He was appointed to the commission in March 1960. Gov. Paul Fannin will name a successor.

Oregon tidelands exploration permit has been awarded on a temporary basis to Standard of California. Shell, Union, and Gulf also hold temporary permits. Seismic and core work being done off Oregon may lead to a lease sale in the months ahead. The state recently opened the tidelands to exploration.

Price for 31°-31.9° Swanson River field crude has risen to $2.66 a barrel, an increase of 45 cents per barrel over the original posting last October. The latest increase came when Standard of California raised the price 25 cents.

Runs of Alberta crude, condensate, and natural gasoline to refineries in September will total 466,327 bbl. daily, according to nominations made at an Alberta Oil and Gas Conservation Board hearing. This compares with 473,392 bbl. daily in August. Of the September total, 176,235 bbl. daily will be exported.

Shell Oil Co. has taken over the the properties of Bishop Oil Co. The $5,626,700 sale was approved by Bishop's stockholders. Bishop, a producing company headquartered in San Francisco, produced 730,768 bbl. of crude from 321 wells in 1960.

Special legislation to clear the way for construction of a Socal refinery at Pascagoula, Miss., has been passed by the Mississippi Legislature. Constitutional amendments approved would permit sale or 99-year lease of a school tract that would be part of the refinery site and would allow counties to grant new industries 10-year exemption on ad valorem taxes. A state referendum will be held October 3 to decide on the proposed amendments (OGJ, Aug. 28, p. 48).

Louisiana's allowable will remain unchanged in September and October. New production will raise output to 1,012,757 bbl. daily compared with 991,411 bbl. daily in July and August.

More Acquisitions by Cities Service Likely

• Company's planned absorption of Columbian Carbon may be kickoff move in drive to boost crude reserves. SEC can't put damper on expansion plans now.

LAST DECEMBER Cities Service Co. was freed from regulation under the Public Utility Holding Company Act.

By eliminating the minority stockholdings in a subsidiary—Arkansas Fuel Oil Corp.—Cities Service ended 20 years of strict supervision by the Securities and Exchange Commission.

The company thus became free to streamline corporate structure without interference and to make acquisitions to strengthen its operations. The initial step was a consolidation of exploration, producing, and marketing operations. Now Cities Service has announced its first acquisition involving more than $100 million.

Under terms of a proposed merger with Columbian Carbon Co., approved by directors of both companies, Cities Service would absorb Columbian in an exchange of stock. With assets listed at about $89 million, Columbian has some 1,615,000 shares of common stock outstanding. Market value of the shares is around $115 million.

Columbian is a leading producer of carbon black, printer's ink, and paints, as well as a producer of oil and gas. Cities Service, an integrated company engaged in all phases of the oil business, will be strengthened in the chemical business and also will add to its oil and gas reserves.

As a refiner which produces only half of the supply for its 313,000-bbl.-daily refining capacity, Cities Service is considered a likely candidate for further acquisitions—especially those involving crude reserves.

Columbian's record . . . Columbian last year had earnings of $6.5 million on sales of more than $80 million compared with $41 million in earnings and almost $1 billion in sales for Cities Service.

Carbon black accounted for 36.6% of Columbian's sales, oil and gas 16.2%, printer's ink 23.2%, gasoline and liquefied petroleum gas 4.5%, and other products 11.7%. Some 7.8% of its sales involved products made by other companies.

Columbian produced 1,598,000 bbl. of crude oil and 55,913,138 M.c.f. of natural gas last year. The latest published estimate at the end of 1958 reported proven gas reserves at 1.311 trillion cubic feet and crude oil at 13 million barrels. Both figures are understood to have risen slightly since then.

Columbian formerly used natural gas as the principal raw material in carbon black manufacture. In recent years the company has found it more profitable to sell its gas to pipelines, and switch to the cracking of aromatic residual oil to make carbon black.

The company operates 25 plants in the U. S., Canada, and overseas.

Foreign-Flag Issue Sidetracked But Not Dead

• Most maritime unions sign new, long-term contracts after backing down on demands for right to organize crews of Panama-Liberia-Honduras tankers.

MOST oil-company and independent tanker operators have signed agreements with one or more of the maritime unions which struck the industry for 18 days beginning June 15—the National Maritime Union, the Seafarers International Union, the Marine Engineers Beneficial Association, the International Organization of Masters, Mates and Pilots, and the American Radio Association.

The NMU and MEBA dropped initial demands for the right to organize crews on vessels flying the flags of Panama, Liberia, and Honduras (OGJ, Aug. 28, p. 44). The contracts provide for a continuing study of the issue, with MEBA reserving the right to strike if it isn't settled within 18 months.

Organizing efforts due . . . However, SIU held out for the right to board the Pan-Lib-Hon ships for organizing attempts and won this concession from several independent tanker owners.

SIU has won favorable rulings from the National Labor Relations Board to the effect that foreign ships in U. S. commerce are subject to U. S. labor law. The Supreme Court has not settled the point, but SIU can be expected to press its drive with growing intensity.

SIU has only one major oil company under contract. That is Cities Service Co., which last week had not yet come to terms with the union. Whether SIU would insist on access to foreign flags with Cities Service, or whether it would settle on the basis of the MEBA formula was a question.

Under this mounting union pressure, Cities Service has sold one of its Liberian-flag tankers, the 70,000-ton Burl S. Watson, to Dutch interests. The ship has been transferred to the Dutch flag, presumably beyond American union reach, and the same buyer is negotiating for a second Cities Service super tanker.

The unions are shooting for a potential 30,000 jobs in the Pan-Lib-Hon fleet, which in recent years has eclipsed the U. S.-flag tanker fleet in size. Tanker owners have registered under these flags to escape U. S. wage rates and taxes, which they say price them out of the world market.

Economic settlements . . . The various agreements which were reached during the past 2 weeks forestalled a threatened resumption of the strike when an 80-day Taft-Hartley injunction expires September 21.

"Why Baker Differential Fill-Up Equipment belongs in your next casing string..."

Product 1091 M&F

This precise mechanism automatically fills your casing from the bottom, constantly adjusting the rate of fill to provide maximum relief from destructive pressure surges—regardless of the depth to which it is run.

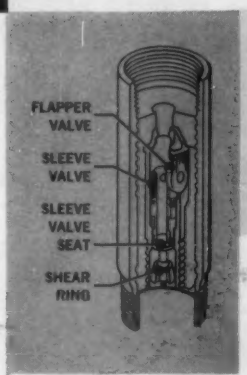
This means you can land casing faster, saving up to 50% on running-in time. This is because you eliminate time-consuming surface filling, and because you can run fast through weak or permeable formations without fear of damaging them. You protect the productivity of your well, and lessen the causes of blowouts, too. The Differential Valve is designed to allow only a 90% casing fill; and, when the rate of lowering slows or stops, the valve closes. Baker Differential equipment thus provides positive action to prevent overfilling.

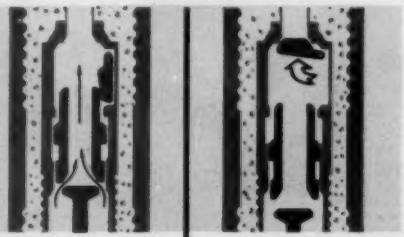
Baker Differential Fill-Up Shoes and Collars may be used in combination, giving the protection of two back-pressure valves and 81% fill.

Yes, Baker Differential equipment belongs in your next casing string—for many reasons. To get the complete story on both regular and circulating Differential, call your Baker man.

What's in a name?

"Differential" doesn't always mean the same thing. In certain equipment it means little more than providing a *fixed* difference by means of a spring. *Baker Differential* works on a difference in areas to balance casing fill with the fluid in the annulus. It takes into consideration differences in depth and running-in speed. It gives instantaneous relief at the point where pressure surges occur—below the shoe. The *difference in differential* is important. Specify *Baker Differential* Equipment.





RUNNING-IN Flapper Valve held open. The Sleeve Valve constantly adjusts fluid entry to maintain the proper rate of fill.

BACK-PRESSURE VALVE Pressuring the casing shears Ring and releases Flapper Valve for cementing or floating. No ball to drop.

DIFFERENTIAL FILL-UP EQUIPMENT

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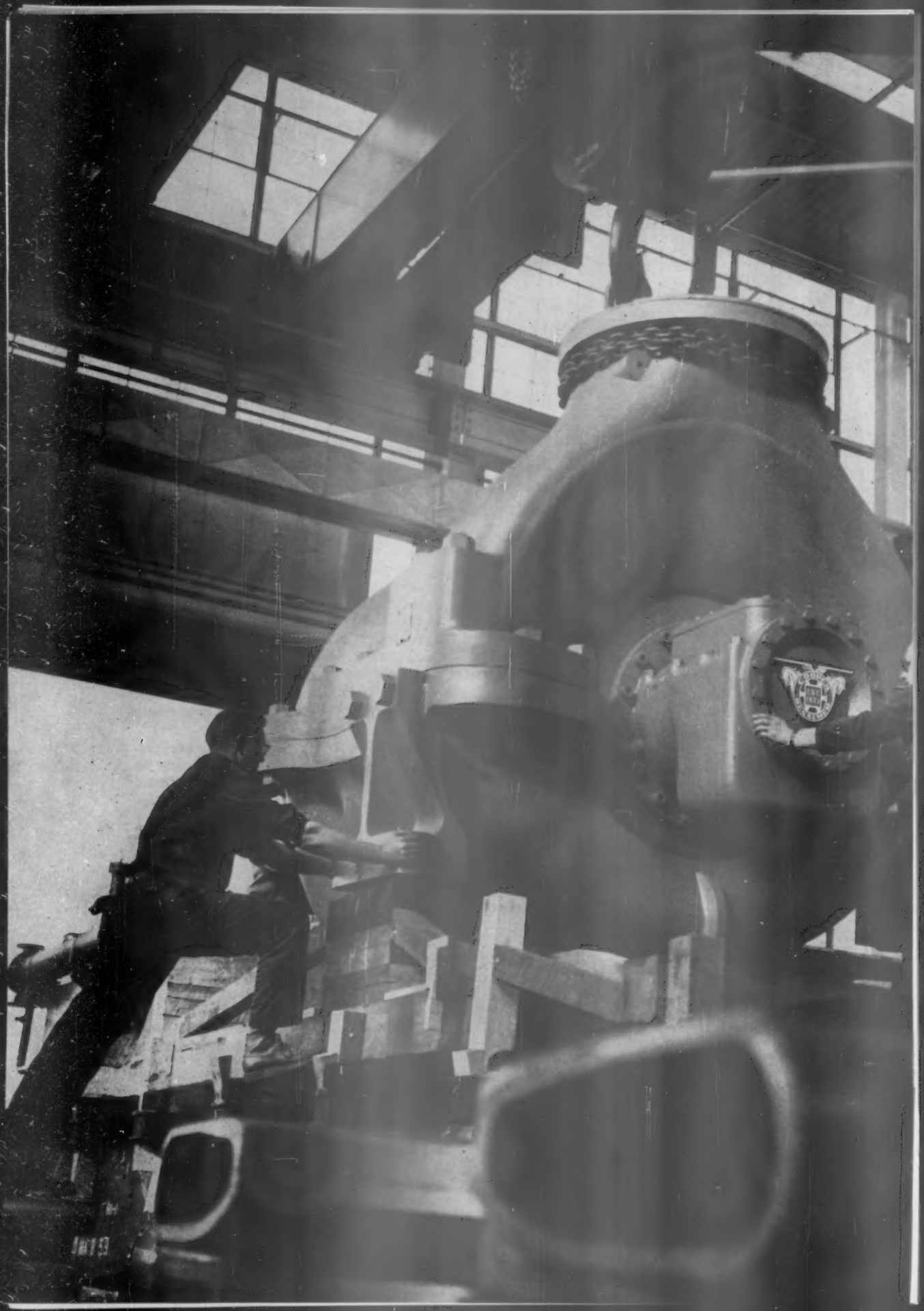
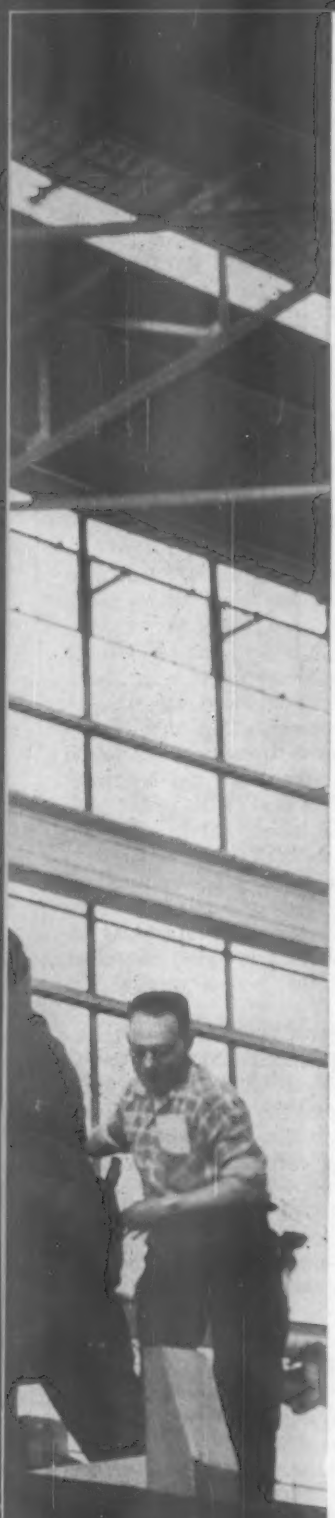




Another Cooper-Bessemer centrifugal goes to work

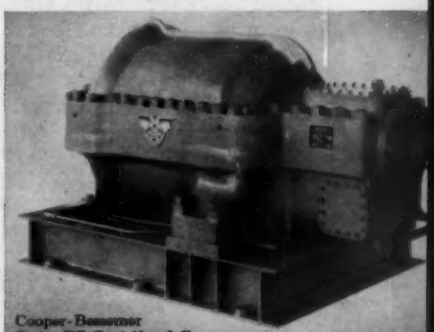
Here's proof of compressor economy

When your plans call for centrifugal compressors, it will pay you to be guided by the experience of others. Take a tip from the *repeat order* record of Cooper-Bessemer centrifugals as a sure sign of *cost-saving performance.*

The Cooper-Bessemer centrifugal shown here is being shipped to a chemical manufacturer for big volume compression. They *know* how reliable C-B centrifugals really are. Another unit has been operating there 'round-the-clock for two years, as part of a process, where constant availability is a *must.*

Repeat orders for Cooper-Bessemer centrifugal compressors have come time and again from many progressive companies.

Many features account for the stamina and dependability of Cooper-Bessemer centrifugal compressors—such as their rugged all-welded impellers, and unique shaft sealing. Find out how they can pay off for you. Call our nearest office or write



Cooper-Bessemer
Series 118 Centrifugal Compressor

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JET-POWERED GAS TURBINES

Two Broad Fuels-Policy Studies in the Mill

• Senate Interior Committee sets up a far-reaching study that may last more than a year. House group plans fall hearings on over-all energy picture.

THE stage is all but set now for a fuels-policy study by a Senate committee.

A proposal setting up such a study has been cleared by the Senate Interior Committee, and a prompt vote of approval by the Senate is expected as soon as the Rules Committee sends the resolution to the Senate floor.

The study will be made either by the full Senate Interior Committee or by a subcommittee of that committee.

Sen. Clinton P. Anderson (D.-N. M.) will be chairman. Three ex-officio members will be named, probably including Sen. Jennings Randolph (D.-W. Va.), representing the coal states, and Sen. John Pastore (D.-R. I.), representing consumer states. The third ex-officio member has not yet been selected.

The committee, after it is formed, will first concentrate on studying statistics and data already available before deciding what remaining steps need to be taken.

The committee will probably hold public hearings, perhaps at several points throughout the country. If so, such hearings probably will not begin before next year.

No time limit has been set for the committee's study. But it is evident that it will run through 1962 and beyond.

Committee aim . . . The goal of the committee, as outlined in the resolution, is to determine what revision in government direction and action is needed, if any, to provide an effective national fuels policy.

The resolution states that it is in the national interest to encourage development of adequate energy supplies.

It cites estimates that by 1980 the consumption of fuel and energy resources in the U. S. will have increased by almost 100%.

Committee procedure . . . The committee will seek to determine the amounts and availability of U. S. energy resources.

It will analyze existing fuel-producing and processing facilities, including transportation, to determine whether they are adequate.

It will study existing governmental policies, programs, and laws which affect development of energy resources, and will suggest changes if it feels that any are needed.

The resolution specifically requires the committee to give consideration to the effect of any of its recommendations on the consuming public and user industries.

It also calls for consideration of existing competitive patterns in the distribution and marketing of fuel oil, including the effect on all regions of the country of adequate supplies of all types.

Competing study . . . Meanwhile, on the House side, preliminary work was continuing on a broad fuels study being undertaken by a House Small Business subcommittee headed by Rep. Tom Steed (D.-Okla.).

This committee has already sent out extensive questionnaires to oil and coal companies and has gathered a great deal of data from government agencies. It hopes to begin hearings this fall.

Originally, the subcommittee was going to study the oil-import-control program, but the target was enlarged to include coal and other facets of the over-all energy picture.

This broadened scope was further emphasized last week when Rep. Wright Patman (D.-Tex.), chairman of the parent committee, announced that the subcommittee was being enlarged to seven members by the addition of two members. One of these is Rep. Arch Moore (R.-W. Va.), a strong coal-industry supporter.

It had been announced earlier that Moore would attend subcommittee meetings but would not have voting rights. Last week's move to add him to the subcommittee gives him equal rights with any other subcommittee member.

The subcommittee membership now, in addition to Steed and Moore, is Abraham J. Multer (D.-N. Y.), Rep. James Roosevelt (D.-Calif.), Rep. Dale Alford (D.-Ark.), Rep. H. Allen Smith (R.-Calif.), and Rep. Ralph Harvey (R.-Ind.).

Patman and Rep. William M. McCulloch (R.-Ohio), ranking minority member of the full committee, are ex-officio members of the subcommittee.

Court to Rule on FAA Rig Order

ATTORNEYS for the Federal Aviation Agency have stated that the agency will not enforce its new height regulations as they affect drilling rigs until its court dispute with the oil industry is resolved.

FAA lawyers went on record during a hearing in New Orleans August 25 before the Fifth District Court of Appeals on a petition seeking an injunction barring enforcement of the new regulations.

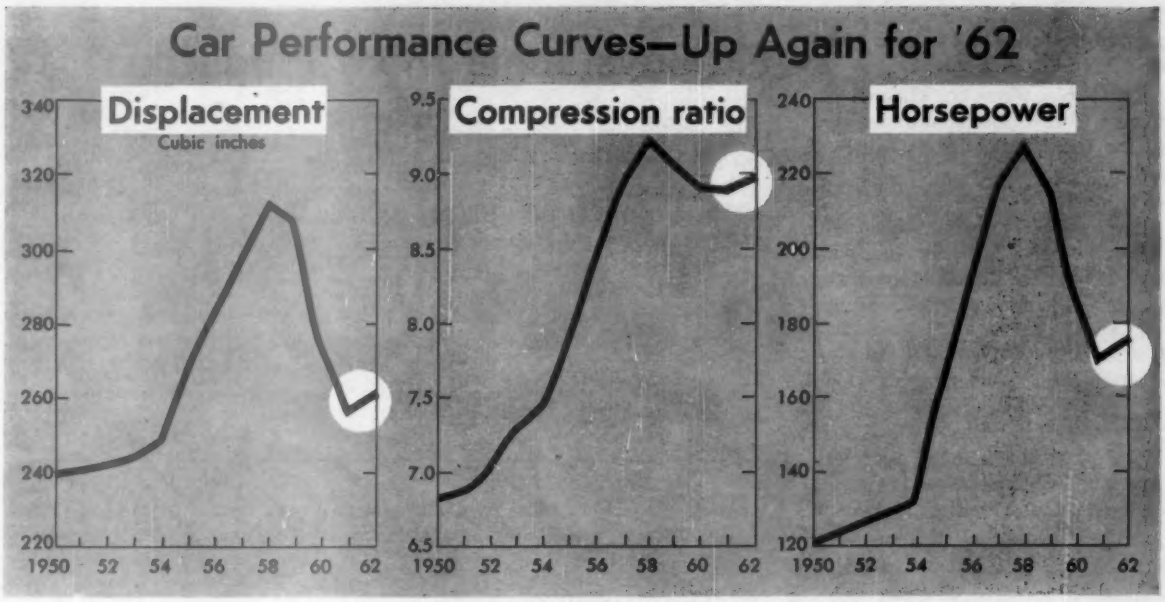
The petition was filed by the American Petroleum Institute and the American Association of Oilwell Drilling Contractors.

A ruling by the court may come this week. At the end of the hearing, the court instructed both FAA and the oil groups to submit by September 4 proposed orders covering points both sides consider essential.

The new regulations would require an FAA permit before a contractor could rig up a rig standing 150 ft. or higher. Further, they would require him to give a second notice when the rig reached the maximum mark.

The oil attorneys contend such regulations are unjust, unnecessary, and impossible.

FAA lawyers argued in New Orleans that its new regulations are not subject to court review until some individual or company has been convicted of violating them.



New Cars: Smaller But More Powerful

• Accent's still on economy, and 1962 models will be smaller. But they'll also be more powerful. Of particular significance to the oil industry: There'll be more signs of the trend toward service-free cars.

THE 1962-car owner may pull up to the gasoline pump a little more often, but it will be increasingly harder to find him in the service bay.

Compacts will dominate the new automobile lines even more than they did in the current model year. However, along with economy there will be a renewed emphasis on performance and a continued drive toward the service-free car.

The average 1962 car will be smaller yet more powerful, will burn more of a higher-quality motor fuel, and will require less frequent oil changes, greasing, and antifreeze fills.

Here is a composite picture of the new models (weighted according to sales forecasts) and their main features:

... Compression ratio up from 8.86 in 1961 to 8.96:1.

... Horsepower up from 171 hp. to 174 hp.

... Displacement up from 256 to 262 cu. in.

... Crankcase-drain intervals of 6,000 miles recommended for the entire Ford line and 4,000 miles recommended for General Motors and Chrysler.

... Chassis - grease intervals of 30,000 to 32,000 miles for the Big Three, accelerating the trend toward the greaseless car with sealed-for-life lube joints expected in 1963.

... An engine coolant (mixture of glycol and water, with rust inhibitor), factory installed and guaranteed for 2 years by Ford and American Motors.

... More new small cars, fewer big cars, and smaller standard cars. Chevrolet is adding still another compact to its line. Ford and Mercury are bringing out models comparable in size to 1956 standards to fit between present compacts and standards. Dodge Dart and Plymouth will be smaller.

Octane requirements ... Octane requirements for all cars on the road will be up slightly, mainly because of scrappage of old cars but partly because of new, hotter 1962's.

It will take a regular gasoline 0.5 research octane number higher to satisfy the same percentage of the car population as before. The 1962 cars by themselves will have a 0.4-RON-higher requirement in the premium range than the 1961 models.

There will be a slightly increased emphasis on premium-requirement cars over 1961, when some 25% of production was designed to operate on premium fuel. Several of the power options on the compacts will require premium.

Also, there will be a few more cars in the superpremium class. The top standard compression ratio advanced from 10.5 to 11:1, while the bottom standard stayed at 8:1. The so-called racing packages remained at 11.25:1, and there will be more of them.

But there isn't expected to be any undue pressure on the refiner's octane pool. His present cushion should be more than adequate.

Economy with performance ... The increase in compression ratio, horsepower, and engine displacement will occur in spite of increased compact sales. Sales of the jazzed-up little

cars, as compared with their poor stripped-down relations, have given manufacturers their cue.

The public wants the cheaper little cars. But it doesn't want to give up the rocket takeoffs to which it became accustomed during the horsepower race.

And so the 1962 models will show a blend of performance with economy. There will be more of the popular options on compacts. Standard cars will be reduced in weight—drastically in some cases—without any reduction in horsepower.

Compact sales spurt . . . GM correctly gaged the demand for compacts, but its cramped Corvair missed the mark on family sales.

As a result it will be converted to a sporter, with the new Nova being given the role of challenging the Ford Falcon for supremacy in the compact field. The Nova will feature a front (rather than a rear) engine, either 4 or 6 cylinder, and increased luggage space.

The Nova will become the fourteenth compact offered by Detroit this year. In 1959, 4 of the 29 models were compacts.

Compact sales increased from less than 2% 4 years ago to 39% of total sales, including imports, in 1961. And compacts are expected to account for 46% to 50% of sales of 1962 autos, including imports.

American Motors forecasts compact sales of 55 to 60% of the U. S.-built total in the coming year. Compacts will command at least two-thirds of the market by 1963, the company believes.

Service-free trend . . . Of greatest significance to the oil industry is the pronounced trend to minimize or eliminate servicing of autos, and to replace the service station as the traditional caretaker.

Ford's bold step in extending the crankcase drain and filter change from 4,000 to 6,000 miles continues to be a subject of controversy in oil and automobile circles. Other members of the Big Three, though not so confident, are moving toward the Ford position.

With the Big Three guaranteeing factory chassis lube jobs for 30,000 to 32,000 miles, it will be a short step to the true greaseless car in another year. Ford engineers say privately they already have the greaseless car.

The new policies adopting a 2-year factory installed coolant and self-adjusting brakes will be followed soon by sealed-for-life automatic transmissions and rear axles.

Auto manufacturers are extending crankcase-drain recommendations mainly on oil-industry improvements in lube oil. "The improvements are good," observes an automotive engineer with an oil company, "but not that good."

The American Petroleum Institute is sticking with its recommendation for oil changes: Once a month in winter, once every 2 months in summer, but never go beyond 2,000 miles.

Actually, GM is much closer to API than is indicated by advertising claims emphasizing mileage. GM tells the motorist to change every 4,000 miles or every 2 months, whichever comes first. Since most motorists drive about 1,000 miles a month or less, the time interval will rule.

Moreover, GM's recommendation is still more conservative than the practice of the average motorist, who changes oil only once every 4,300 miles and is trying to get more mileage from his oil every year.

Improvements needed . . . While lube-oil quality has been improved greatly in recent years, further improvements are needed—especially to counteract engine deposits before normal operating temperature is reached. Most ring and cylinder wear occurs before the oil has been warmed up, and this is the condition under which cars are operated a large majority of the time.

Surveys indicate that 60% of all driving is done before oil reaches its most efficient temperature, even during the summer.

The factory-sealed lube joints are equally controversial and unproven. Several of the 1961 models which were supposed to be good for 30,000 miles have had to be serviced before operating one-third of that distance, according to industry reports.

Technical service staffs of oil companies agree that strides toward the service-free car have been made. But at the present state of development, the longer service intervals are considered to be compromises offering marginal economic gain.

Be that as it may, Detroit is plainly out to develop not only the greaseless car but the completely service-free car. This is particularly true at Ford, where top design people have their sights set on a submerged engine good for 100,000 miles.

Here is the kind of Ford thinking which is leading the industry:

"The car of the future may require no attention at regular intervals except for filling the fuel tank. It will be free from the need of adjustments for extended periods of time. Unless it is damaged, it will probably not require repairs while you own it. When you trade it in for the latest model, it won't even be necessary for the dealer to kick the tires."

There may be false starts on the road to this goal, but that's where Detroit is headed—and the marketer will be forced to adjust in a hurry.

PPI Buys Some More Production

PRODUCING Properties, Inc., Dallas, has paid a total of $1,100,000 for oil and gas properties in a six-state area.

The company acquired all the producing oil and gas properties and non-producing acreage owned by Durbin Bond & Co., Dallas, and some producing royalty interests owned by Tokay Oil Co., Inc., Dallas.

Involved are various working interests in 97 wells in Arkansas, Kansas, Louisiana, Mississippi, Oklahoma, and Texas; 407 producing royalty acres, mainly in the East Texas and Oceanic-Penn fields of Texas; and leasehold rights on 12,700 undeveloped acres.

The purchase will increase PPI's net daily production about 450 bbl.

This is PPI's third major production purchase this year. It recently paid a total of $19.5 million for Vistario Corp. and Shoreline Petroleum Corp. properties.

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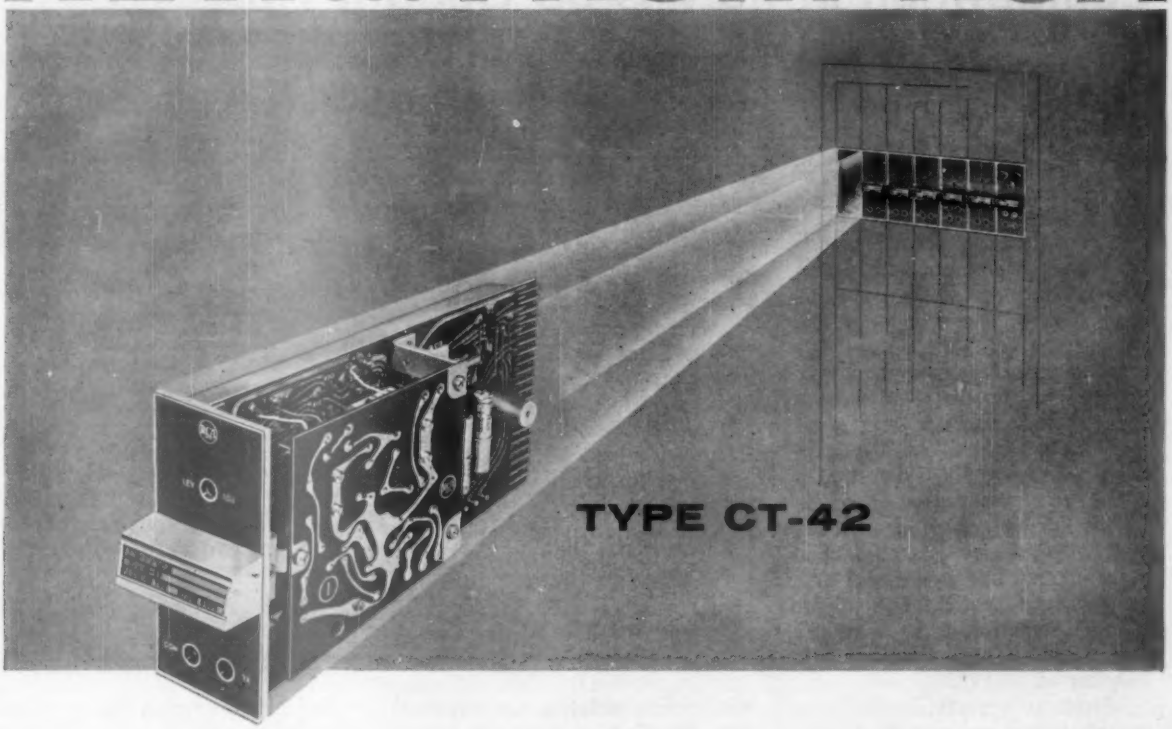

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Competition in Italy Is So Good it Hurts

● Demand is booming but newcomers in the market and competition from the state-owned ENI are putting the squeeze on major companies.

IN an era of rock 'em, sock 'em oil competition, Italy is almost in a class by itself.

Seldom, if ever, has a country's oil industry ever taken such a stiff financial beating where so many signs point in favor of a prospering oil business.

Oil demand is booming. Internal consumption the first 5 months of this year was up 16.4% over January-May last year. Total consumption was 384,000 bbl. daily. Bunker sales were up one-third.

The relatively big export business, while slowed by competition from other European refiners, slipped less than 5%. The volume of crude imported in the 5 months exceeded total crude imports into Italy for all of 1953.

Products imports in the same period showed an over-all decline, meaning a higher share of local demand is being refined at home. Gasoline, generally a bugaboo in European markets, showed a much greater rate of growth than fuel oil. Domestic crude output, while only a small fraction of total demand, nevertheless showed a percentage rise greater than imports.

But while over-all business is good, competition is even better. Some of this is caused by the more or less recent entry of powerful newcomers, including Amoco-Indiana Standard, Cities Service, British Petroleum, and BV-Aral, a German firm.

An even more important factor is that Italy is the home stamping ground of ENI's Enrico Mattei, whose avowed purpose is to knock the props from under major oil companies. And he is using every advantage he can gain from low-cost products made from cheap Russian crude and from his monopoly in the domestic natural-gas business.

In 1959, the latest year for which figures are available, Purfina lost $2.6 million in Italy. Esso lost $1.8 million, and Shell lost almost as much. The situation has worsened since then.

A Look at Gasoline Prices in Europe

(February 1961 prices in cents per U. S. gallon)

	REGULAR			PREMIUM		
	Retail Less Taxes	Taxes	Total	Retail Less Taxes	Taxes	Total
Germany	23.5	30.9	54.4	29.9	30.9	60.8
Sweden	23.0	30.5	53.5	25.2	30.5	55.7
Spain	22.6	37.0	59.6	24.2	40.3	64.5
England	19.4	29.1	48.5	24.7	29.1	53.8
Denmark	19.2	30.6	49.8	22.5	30.6	53.1
France	18.9	56.8	75.7	22.0	58.3	80.3
Netherlands	18.3	27.4	45.7	21.8	27.5	49.3
Belgium	18.2	40.5	58.7	21.0	40.8	61.8
Switzerland	17.5	21.9	39.4	21.9	21.9	43.8
Luxembourg	17.5	30.2	47.7	20.5	30.3	50.8
Austria	17.0	29.5	46.5	24.0	29.8	53.8
Italy	15.9	42.5	58.4	20.9	43.6	64.5

Gasoline price falls . . . Despite soaring gasoline consumption that rose 30.4% the first 5 months, competition for sales is among the toughest in the world.

The rise in gasoline demand to 64,000 bbl. daily has been encouraged by a gradual reduction in various taxes. In the past 2 years these have been shaved from 55.4 to 42.5 cents per gallon. This still leaves room for improvement since Italian taxes force motorists to pay at the pump the fourth highest price in western Europe for regular and the second highest for premium.

The reduction, however, combined with the doubling of motor vehicles on Italian roads in the past 6 years, has accounted for the upsurge in demand.

But the growing demand has not been reflected in gasoline prices. In the past 2 years, the retail price less tax has fallen nearly 5 cents per gallon. Regular sells for about 15.9 cents and premium for about 20.9. This price, which includes the retailers markup, transportation, and other charges, is less than in any other large European country. Considering the laid-down price of imported gasoline in Italy is about 10 cents per gallon, there is little room for profit at going retail prices.

There is one bright spot. About one-quarter of all gasoline sales are premium.

Fuel-oil competition . . . Fuel oil is Italy's major product, accounting for about 60% of total inland demand. Even so, fuel-oil yield of refineries is high. This fact, plus fuel-oil imports, mostly from eastern Europe, helps push down the price. The current price of residual, from the refinery, is about $1.70 per bbl.

The low cost is not passed on to the Italian consumer. He must pay an additional tax of approximately 70 cents per bbl., which brings his total cost to about $2.40.

It is here where Mattei's ENI parlays its gas monopoly into a powerful commercial weapon against its private competitors. Natural gas—major source of ENI's income—has a price pegged to the cost of fuel oil, including the tax.

Mattei can force down the price of fuel oil, much of it made with low-cost Russian crude, with the

knowledge that income from gas sales can help offset losses on the fuel-oil side of the business.

Exports decline . . . Italian product exports showed a slight decline last year after several years of annual increases. The first 5 months of 1961 foreign sales dropped a bit more sharply to a level of nearly 5% less than the same period a year ago. Shipments of gasoline and gas-oil, the highest priced products, dropped most sharply.

Gasoline exports, hurt by competition from Europe's other vigorous and expanding refining industries, fell 17.3% to 37,000 bbl. daily. Gas-oil shipments were down 22.6% to 46,000 bbl. daily. These declines more than offset a 20% increase in heavy fuel-oil sales to 58,000 bbl. daily, and a gain of one-third in light-oil sales to 6,000 bbl. daily. Jet-fuel shipments, which account for most of the remaining exports, have remained unchanged.

Japanese Plants Will Make Butanol, Octanol Through New Process

A $20 MILLION industrial complex for commercial production of butanol and octanol by synthesis from naphtha will be designed for a new Japanese firm by Stone & Webster Engineering Corp.

The project, involving construction of several plants to process naphtha through intermediate products to finished industrial solvents, is slated for Yokkaichi, near the industrial city of Nagoya on the island of Honshu.

It will be operated by Daikyowa Petrochemical Co., formed by Daikyo Oil Co. and Kyowa Fermentation Industry Co.

Details of the new synthesis process developed by scientists of Kyowa Fermentation, one of Japan's largest producers of beverage alcohols, chemicals and antibiotics, have not been revealed. The facilities to be designed by the American engineering firm will produce ethylene and butyraldehyde.

The Daikyowa project is one of three government-approved, refining-petrochemical complexes in Japan's second 5-year petrochemical-expansion plan.

India, ENI Sign Credit Pact

• Agreement calls for Italian agency to provide financing for oil equipment. Goods will come from ENI affiliates.

INDIA and ENI last week reached agreement on a $100-million credit for oil equipment offered by the Italian oil agency.

The pact was signed in New Delhi by Dr. Giuseppe Ratti, representing ENI, and K. K. Sahni of the Indian Department of Mines and Oil. It is the first oil agreement ever made between India and Italy.

The signing followed negotiations carried out in Rome and New Delhi between Enrico Mattei, head of ENI, and K. D. Malaviya, Indian Minister for Mines and Oil.

The credit will be a key source of finance for India's ambitious third 5-year oil plan, during which a vast expansion of a government-dominated oil industry is projected. It will be used primarily to purchase oilfield, pipeline, and processing equipment made in Italy by ENI-affiliated companies. Technical assistance also is a part of the package.

While the agreement covers a specific list of projects, the financial details of each will be negotiated as the need arises. Among the projects will be a gas-bottling plant at Barauni refinery, now under construction in Northeast India, a gas separator to be built in Assam, a naphtha cracker for use in petrochemical manufacture, and a lubricating-oil plant. Location of the latter has not been definitely decided.

ENI credit also will be used to purchase pumping equipment for product pipelines originating at Barauni refinery. One line will extend to Delhi, via Kanpur and Lucknow, and another to Calcutta. Line pipe for the system will be made locally by the Indian Government.

Details of India's repayment commitment were not initially disclosed. ENI originally offered the credit for 12 years, repayable at 6% annual interest. The Indian Ministry of Finance objected, however, on the ground that this rate was too high and the amortization period was too short. These original terms have been eased, and ENI has agreed not to press for early payment in foreign exchange equipment imported from Italy.

Exploration excluded . . . The $100-million credit is less than the $120 million originally offered by ENI. The other $20 million was to have covered an exploration program in the Clutch region of Northwest India, but no agreement could be reached on exploration terms.

Ironically, the 75-25 profit split with which Mattei has won concession after concession in other countries is not good enough for India. Mattei wants a return of 25% tax free, on his exploration investment. But India recently signed an agreement with Burmah Oil covering operations of the jointly held Oil India Ltd.

This pact includes a tax free dividend of from 9 to 13% on the equity capital. India is trying to apply the same type of agreement, designed to cover proven, shut-in production, to a rank exploration area.

The upshot could be that India itself will carry on an ENI-financed exploration program in the Clutch area. The difference would be that, as in the case of Russian and French programs, India ultimately would bear the cost in case of failure.

Crude production starts . . . Opening of small-scale crude production in the government's Ankleshwar field in western India took place almost coincidentally with the signing of the agreement with ENI.

Output, less than 100 bbl. daily initially, will be stored at the field until a shipment of about 1,400 bbl. is sent by rail to Burmah-Shell's refinery at Bombay.

Production of about 200 bbl. daily also is being taken from Cambay oil field. This is being sold to neighboring towns as fuel oil.

Output from the region will later be refined at a 40,000-bbl. plant which the Oil and Gas Commission has decided to locate at Koyali, a village 8 miles outside of Baroda, Gujarat State. The centrally located site is 60 miles south of Ankleshwar, 40 miles from Cambay, and 70 miles from a new oil-field discovery at Kalol, near Ahmedabad.

World Output Climbs

- **Increased foreign production accounts for much of 85,000-bbl.-daily world gain during June.**

FOREIGN crude production rose about 50,000 bbl. daily in June, as increases in North Africa, Latin America, and the Far East offset a slight dip in the Middle East.

Output from the French Sahara hit another new high, with the total pushed upward more than 10,000 bbl. daily by SNPA's new production at El Agreb field. This output started moving to the coast of Algeria in April after completion of a 25-mile pipeline link to the terminal of the pipeline system from Hassi Messaoud.

Russia continues to pull farther ahead of Venezuela as the world's second-ranking crude producer. Second-quarter output of 40.6 million metric tons, against 39.1 the first three months, was equal to a rise of about 90,000 bbl. daily in the period to 3,260,000 bbl. daily.

TREND OVER THE LAST YEAR
(Thousands of barrels)

	Western Hemisphere less U. S.	Middle East	Total free world outside U. S.
1960			
June	4,275.0	5,157.0	10,542.2
July	4,214.2	5,103.5	10,448.2
August	4,420.1	5,146.8	10,620.5
September	4,311.3	5,500.2	10,941.3
October	4,243.9	5,630.6	11,104.5
November	4,206.8	5,482.2	10,964.2
December	4,341.2	5,550.1	11,152.2
1961			
January	4,594.1	5,568.1	11,418.8
February	4,616.9	5,697.7	11,572.8
March	4,448.6	5,764.1	11,510.1
April	4,287.9	5,558.7	11,151.7
May	4,395.3	5,519.6	11,271.3
June	4,449.0	5,483.0	11,320.7

World-Wide Crude Production: Daily Average in Thousands of Barrels

Country—	June 1961	May 1961	June 1960
Western Hemisphere			
Argentina	238.4	238.4	161.4
Bolivia	7.6	7.8	9.8
Brazil	96.6	96.6	72.4
Canada	612.3	612.0	527.9
Chile	24.1	22.3	19.1
Colombia	145.2	146.4	156.3
Cuba	0.2	0.2	0.2
Ecuador	8.3	8.3	7.4
Mexico	286.1	286.1	263.8
Peru	52.2	52.2	50.9
Trinidad	124.8	124.8	117.7
Venezuela	2,853.2	2,800.2	2,888.1
Total	4,449.0	4,395.3	4,275.0
Europe			
Austria	44.7	44.7	46.6
France	41.0	41.0	39.5
West Germany	120.3	118.3	109.4
Italy	35.6	37.4	40.9
Netherlands	38.6	38.9	35.8
United Kingdom	1.7	1.7	1.8
Yugoslavia	27.4	29.4	17.5
Total	309.3	311.4	291.5
Middle East			
Bahrain	45.0	45.0	45.0
Iran*	1,222.0	1,279.0	961.0
Iraq†	986.7	913.8	1,003.2
Israel	2.3	2.3	2.4
Kuwait	1,619.5	1,566.3	1,595.5
Neutral Zone‡	183.1	184.2	131.4
Qatar	178.5	180.0	171.4
Saudi Arabia	1,238.9	1,342.0	1,240.4
Turkey	7.0	7.0	6.7
Total	5,483.0	5,519.6	5,157.0

Country—	June 1961	May 1961	June 1960
Other Asia			
British Borneo	90.0	90.0	93.1
Burma	10.5	10.0	10.7
India	8.5	8.5	8.5
Indonesia	453.4	429.4	430.8
Japan	13.2	11.9	9.9
New Guinea	3.1	3.1	4.4
Pakistan	5.9	5.9	5.9
Total	584.6	559.3	563.3
Africa			
Algeria	378.5	356.7	153.2
Angola	1.5	1.5	1.5
Egypt	71.7	71.7	66.6
Middle Congo	2.0	1.8	.....
Gabon	14.8	15.3	15.0
Morocco	1.7	1.7	1.9
Nigeria	24.6	37.0	17.2
Total	494.8	485.7	255.4
Free World			
Foreign	11,320.7	11,271.3	10,542.0
United States	7,102.8	7,146.9	6,938.7
Total	18,423.5	18,418.2	17,480.9
Communist Countries in Soviet Orbit			
Romania	234.0	234.0	234.0
Russia	3,260.0	3,260.0	2,850.0
Other Communist	100.0	100.0	100.0
Total	3,594.0	3,594.0	3,184.0
WORLD TOTAL	**22,017.5**	**22,012.2**	**20,664.9**

Figures are from reliable industry reports or government sources. Estimates are made where complete reports are lacking. *Includes estimated 6,000 bbl. daily from Naft-i-shah field not operated by consortium companies. †Includes production from Naft Khaneh field, operated by Iraq Government. ‡Includes offshore production by the Japanese-based Arabian Oil Co.

Sukarno Demands Lion's Share of Oil Profits

• Irked by private firms' failure to sign pacts on his terms, Indonesian president orders 60-40 split in government's favor. But this may not stand.

INDONESIAN oil's never-never land changed overnight last week to a hard, cold reality in which private producing companies are directed to turn over 60% of their profits to the government.

The change was abrupt. It was made by President Achmed Sukarno by fiat. Two hours later Sukarno—the island archipelago's one-man government—flew out of the country to attend a political meeting in Belgrade. Represented at this meeting were governments of the world which regard themselves as "uncommitted" in the East-West power struggle.

None of the three private oil companies — Royal Dutch-Shell, Standard-Vacuum, or Caltex—which furnish Indonesia's only hard-currency income was prepared to comment on Sukarno's dictum. All, unofficially, are sure that the door is still open for further negotiations.

Obviously stung by the failure of the three companies to come to terms acceptable to him, the Indonesian president issued a short announcement broadcast by the government radio. It said simply that by government decree, all three companies must begin immediately operating as contractors for the government and that all three must give the government 60% of the profits from their operations.

The announcement added that all talks aimed at reaching a new basis for private-company operations in Indonesia are postponed "indefinitely."

Fuzzy status . . . The three companies, which produced an average of 420,000 bbl. of oil daily in the first half of this year and exported most of it, have been operating in Indonesia since last October with a very fuzzy, pseudo-legal status.

The country's oil industry was officially and legally nationalized when Sukarno issued a "government regulation in place of a law" which cancelled all existing oil concessions. This regulation reserved all mineral rights to the government and specified that only the government would be allowed to engage in any form of mining activities. It did say, however, that private companies (which have been producing oil in Indonesia since 1893) could act as contractors for the government.

Since January the three companies have been trying to work out contractural agreements with the government which would give both the companies and Indonesia "some kind of a deal we can all live with."

It was an open secret in Jakarta that Sukarno fully expected these agreements to be made in time for him to announce them August 17, when the country celebrated the anniversary of its proclamation of independence from the Dutch.

The anniversary celebration came and went, but there was no announcement from Sukarno because there was no meeting of minds on the complex operating agreements.

Shell, Caltex, and Stanvac have been operating producing oil concessions under the terms of Dutch mining laws dating back to 1899 and 1906. Since World War II, none of the three has been able to persuade the government to add to the concession areas or enlarge them in any way.

As a result Shell, which produces about 117,000 bbl. daily, has remained a stable producer. Standard-Vacuum, producing gradually depleting fields, halted exploration in 1958 and is hard put to maintain production at 70,000 bbl. daily. Caltex, last of the three to enter Indonesia, is the only one of the companies with enough exploratory acreage to keep discovering and developing reserves. Caltex produced an average of 218,000 bbl. daily the first 6 months of this year and can boast of several new oil discoveries on its concession acreage.

In spite of the abruptness and apparent finality of Sukarno's action in proclaiming the overnight 60-40 division of future oil profits, there are few close to the situation who believe this is the last word. And although the president's announcement said talks on new agreements are postponed indefinitely, observers believe they will resume after his return from Yugoslavia.

Argentina Granting Acreage

. . . to Esso, Shell in revision of exploration agreements made in 1958. Original tracts are dotted with dry holes.

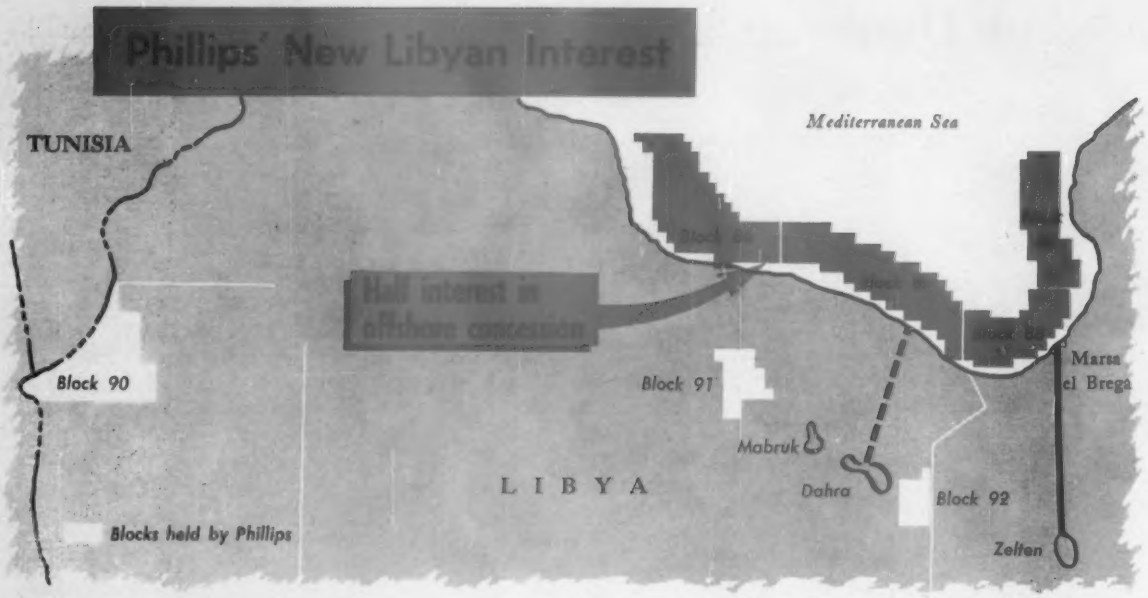
ESSO and Shell will each get new exploration and development acreage in Argentina to replace the dry-hole tracts where they have been working for more than 2 years.

Dr. Juan J. Bruno, president of YPF, the state oil agency, said the new acreage will be granted as part of contract modifications being negotiated with the two companies. The initial agreements were made late in 1958 and covered selected areas in Neuquen, Buenos Aires, and Rio Negro provinces.

The new contract areas will be located in Neuquen and La Pampa. But in the case of Esso at least, about 467,000 acres from the old contract area will be retained in the new agreement, which will include a total of about 3,960,000 acres.

Bruno said that Esso invested $13.5 million on its original acreage without success. This is $3.5 million more than called for in the original contract. Shell spent the equivalent of about $7.5 million out of a commitment that totaled $8.4 million.

Esso will pay $400,000 to YPF, and Shell $1.7 million, for work already done by the agency on the new acreage. The companies also will grant further credit for YPF to pay for product imports. This will be in addition to unused credits from the companies that YPF has on hand.



Atlantic Shares Libyan Rights With Phillips

- Interest in big offshore area, where Atlantic has been doing geophysical work for some time, is being split 50-50. Drilling's to start next year.

PHILLIPS Petroleum is taking half interest in Libyan offshore concessions held by Atlantic Refining Co.

The Libyan Petroleum Commission has approved the assignment by Atlantic to Phillips of the rights which cover 6.7 million offshore acres in the Gulf of Sirte. Atlantic won the rights in June 1960. It will now be operator in the joint venture.

The acreage, covering more than 10,000 sq. miles, consists of Concessions 86 through 89 (OGJ, Oct. 10, 1960, p. 122). The rights stretch for about 400 miles across most of the Gulf of Sirte and are entirely offshore, except for one jag in the boundary which includes the land area around Sirte. The concessions range seaward from 25 to 50 miles off the coast, and water depths range from zero to 1,800 ft. But maximum depth is limited to a relatively small area.

Atlantic has been conducting geological and marine geophysical studies on the acreage for nearly a year. A drilling program is expected to start in 1962. But a seismic survey is only half completed, and the location for the first wildcat is yet to be decided.

Phillips no stranger . . . Phillips' interest in Libya's offshore waters is not new. The company was an unsuccessful bidder when Atlantic won the tracts last year. Phillips did not bid on precisely the same acreage, but there was considerable overlapping.

Atlantic got in its bid first, however, and under the original oil law—now being revised—the first company to enter a bid had priority. As part of its offer, Atlantic agreed to give up a 25% depletion allowance, a concession to the government commonly made after major oil discoveries started coming in.

Atlantic has the option of converting its concession agreement to the terms of the amended oil law, which is much stiffer, or to forego the chance to compete for any future acreage. The company is studying the problem, but has made no decision.

Phillips recently acquired its first Libyan acreage when it won rights to three tracts turned back by other companies (OGJ, May 15, p. 114). One of these, Block 90, is in western Libya, bordering Tunisia. The other two tracts, Blocks 91 and 92, are in North Central Libya.

Big Expansion Set for Belgian Refinery

CONSTRUCTION contract for a 100,000-bbl. expansion at the Ste. Industrielle Belge des Petroles refinery at Antwerp, Belgium, has been awarded to Foster Wheeler Corp.

Ste. Foster Wheeler, a French subsidiary, will supervise construction and startup of facilities at the jointly owned British Petroleum and Petrofina plant.

New equipment will include a 100,000-bbl. distillation unit with LPG recovery facilities, a 10,000-bbl. desulfurization unit employing the Shell trickle process, a 11,500-bbl. UOP Unifiner-Platformer, and a hydrogen sulfide-absorption and sulfur-recovery unit with a capacity of 60 tons a day.

Extensive modification of offsite facilities will be a part of the project. These will include addition of crude, intermediate, and final product storage, installation of a 60-ton-per-hour steam boiler.

The $30.8-million program is scheduled for completion by the spring of 1963. It will raise total capacity of the refinery to 160,000 bbl. daily. This will make it the largest in Belgium.

"It's Dependable," says West Texas Contractor using Bethlehem Wire Rope. These servicing units are in the yard of Hoffman Oil Well Service Company, Seminole, Texas. D. G. "Pappy" Hoffman, shown in the picture, specifies a considerable amount of Bethlehem Wire Rope on much of his servicing equipment. For example, each of the units shown contains more than two miles of Bethlehem 6 x 7 solid-plastic core line, and about 500 ft of Bethlehem 18 x 7 non-rotating rope. "We get good performance from Bethlehem rope," said Mr. Hoffman. "It's dependable, and we can't ask for more than that."

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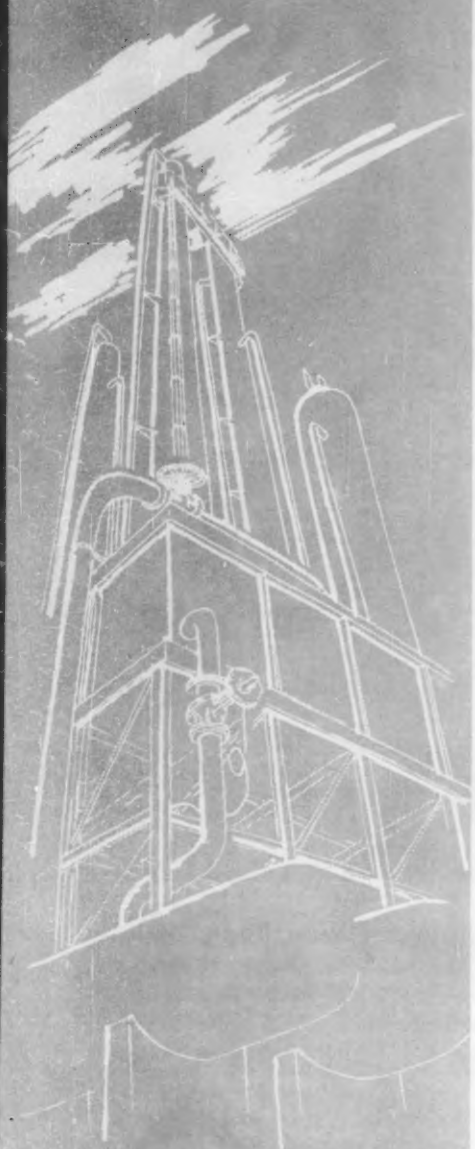
OIL AND GAS JOURNAL

Special report on

Petrochemicals

Annual survey of plants and construction projects . . . the outlook for synthetic rubber . . . and a look at the swift growth of aromatics

BY HUGH S. PYLANT
Petrochemical and
Gas Processing Editor



THE Oil and Gas Journal's ninth annual survey of petrochemical plants and construction projects indicates that world-wide building is continuing at about the same level as last year, but the geographical distribution of these projects has changed. The U. S. shows a substantial decrease with Japan being the big gainer. Table 1 shows a breakdown of existing plants and new projects by broad geographical grouping.

Last year's survey listed a total of 319 new-construction projects planned or under way compared to 304 this year.

United States

Petrochemical production in the U. S. is up again this year, as shown in Table 2, but not as sharply as in previous years. This trend bears out last year's prediction that the industry is reaching maturity and future growth rates should begin to approach the gross-national-product rate (OGJ, Sept. 5, '60, p. 112).

Despite reduced growth rates of production and sales, the future still looks bright for petrochemicals and new records are expected this year. All in all, it appears the petrochemical industry is settling down for a period of steady growth and any spectacular gains in the future will be limited to specific product groups.

Table 1—World Status of Petrochem'cal Plants

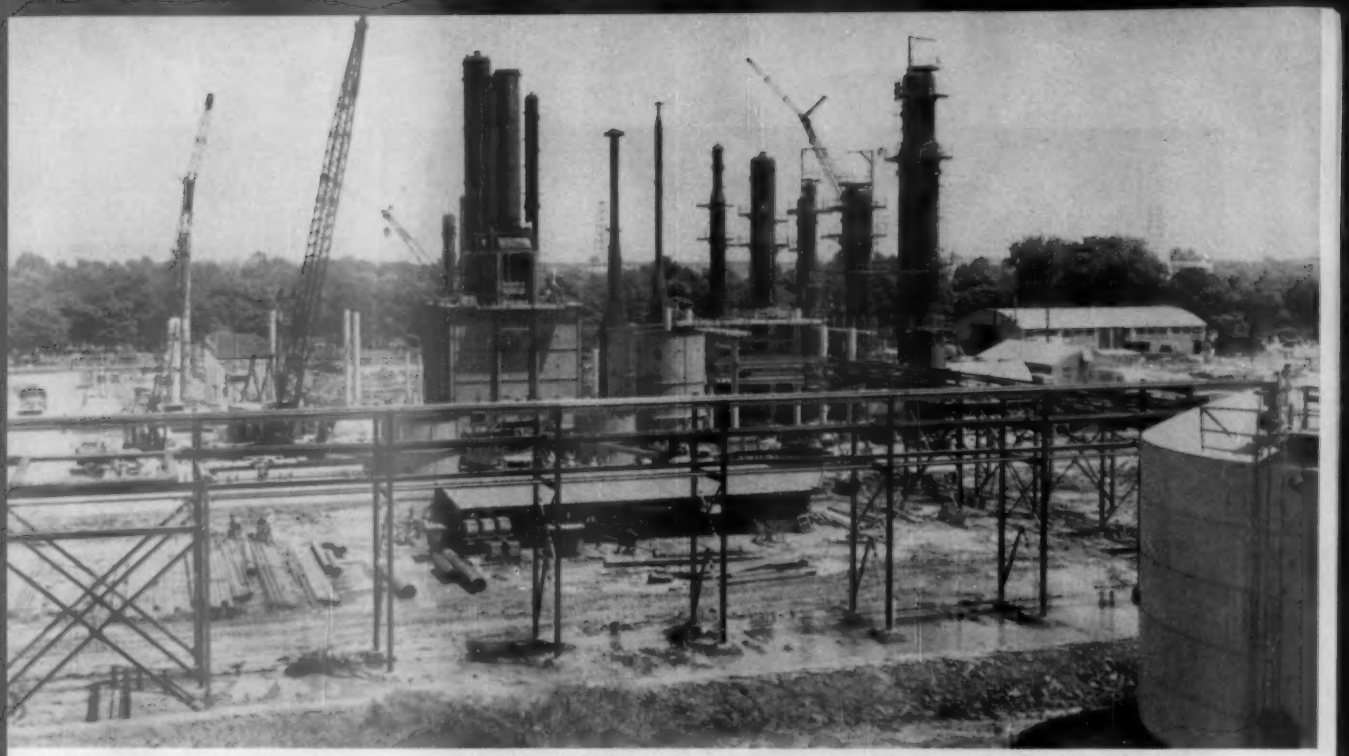
Area—	Existing Plants	New Projects
North America	466	115
South America	23	24
Western Europe	174	85
Australasia	60	80
Total	723	304

Construction projects are down more than 20% in the U. S. this year. Only 93 new plants or expansions are listed in this latest survey compared to 118 last year. As can be seen in Table 3, the big decrease in building activity is among chemical companies. Oil companies have remained at the same level.

. . . Gulf Coast building is off almost 50% to 38 projects compared to last year's record of over 60.

TABLE 2—U. S. OLEFIN DEMAND
(millions of pounds)

	1955	1958	1959	1960	1961 (est.)	1965 (est.)
Ethylene	3,000	4,200	4,900	5,500	6,000	7,500
Propylene	1,400	1,900	1,950	2,500	2,800	3,500
Butylenes	2,550	2,650	3,100	3,500	3,700	4,000



NAPHTHALENE will come from Sun Oil Co.'s Toledo refinery when this unit is completed late this year. Cost of the unit is estimated at $8,000,000. Capacity will be 100,000,000 lb. per year.

Leading this year's construction projects are two huge complexes that will be located near Houston: Monsanto Chemical is under way on its Chocolate Bayou complex that will feature the world's largest ethylene unit with a capacity of 500 million pounds annually, and facilities for making benzene, naphthalene, phenol, propylene, cumene, acetone, ethylbenzene, and oxoalcohols. Gulf Oil has announced plans for a fully integrated complex that will produce high purity ethylene and propylene, and other chemicals.

Facilities for the production of aromatics seemed to offer the most attractive investment in this area during the past year as 8 projects of this type are planned or now under construction. A story on the future of aromatics that appears on Page 171 of this issue gives a look at the potential of these important chemical building blocks.

Olefin and polyolefin projects tied for second place in popularity with five of each reported at this time. In addition to the Monsanto and Gulf projects mentioned above, Phillips is planning to add about 200 million pounds to the annual ethylene capacity of the Sweeny, Tex., plant. This present round of building will add over 1 billion pounds of annual capacity to an already crowded ethylene picture.

Of particular interest was the announcement of three acetylene-from-hydrocarbons units for this area. There is still some doubt in some areas of the industry as to the economic feasibility of this type of plant, but apparently each of the companies involved was faced with circumstances that made the project look attractive (OGJ, June 12, p. 149).

... East Coast construction is also down sharply in the number of new projects planned or under way. Last year's survey carried 26 projects compared to only 17 for this year.

Aromatics also top the list for this area's construction projects with three shown as planned or under way. Possibly the most significant of these projects is the 100-million-pound per year naphthalene plant that is scheduled for completion late this year at Delaware City by Tidewater Oil and Collier Carbon.

There are two projects scheduled in each of the olefin and polyolefin categories. Sun Oil is involved in major plants in both of these fields: One is a joint project with American Viscose to build a 100-million-pound per year polypropylene plant at New Castle, Del., scheduled for completion later this year; and the other is a joint project with Olin-Mathieson to construct a 225-million-pound per year ethylene plant at North Claymont, Del., also to be completed in late 1961. Ethylene facilities at Humble Oil's Linden, N. J., plant are being expanded by 45 million pounds per year with completion expected early 1962.

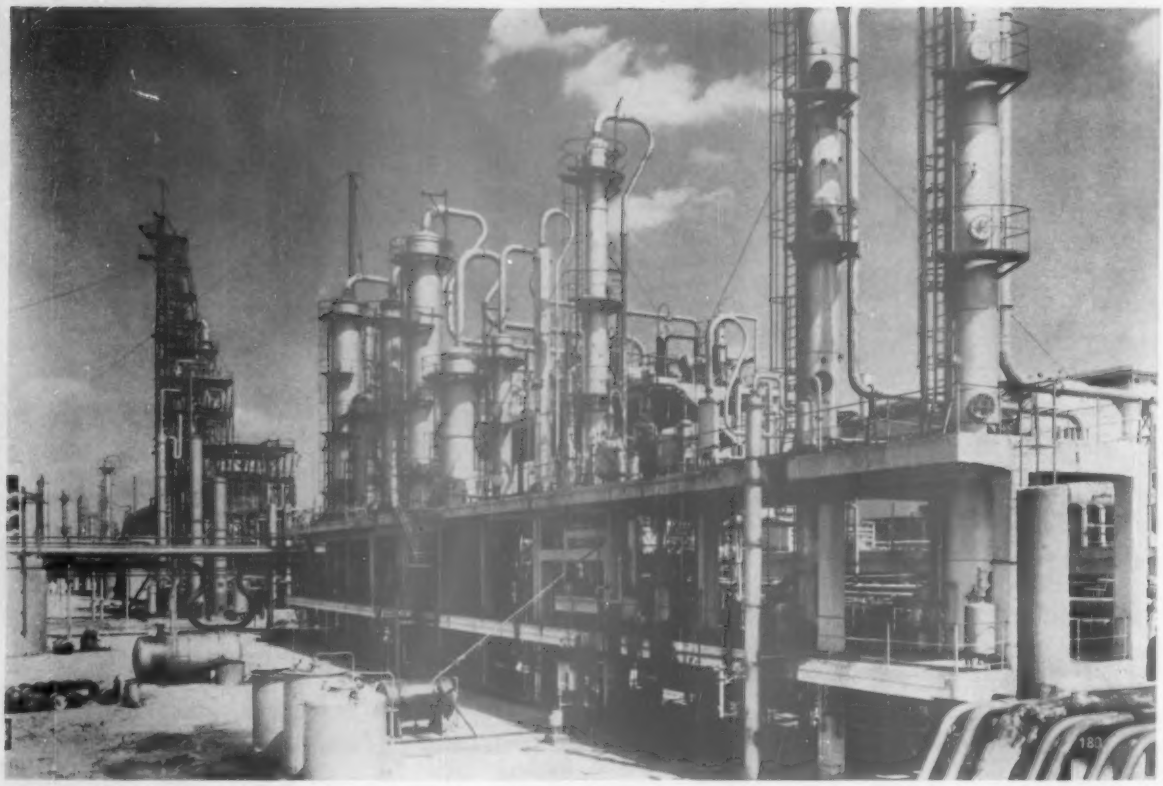
Shell Oil Co. has picked a spot on Delaware Bay near Smyrna for the company's first East Coast refinery, with long-range plans calling for a chemical plant or complex and research facilities.

... West Coast building activity in new petrochemical projects has pretty much followed the pattern of the other two coastal areas. This year's survey lists 5 projects planned or under way for this section compared to 11 last year.

Again aromatics are ahead in number of projects with two scheduled for this area. The largest is Tidewater and Collier Carbon's 50-

TABLE 3—BREAKDOWN OF NEW U. S. PROJECTS

	1960		1961	
	Basics	Intermediates and end products	Basics	Intermediates and end products
Oil Companies	14	18	20	12
Chemical Companies	9	64	4	46
Joint Enterprises	4	9	5	6
Total	27	91	29	64



IN NORTHERN ITALY, Montecatini is busy turning out olefins, polyolefins, and fertilizer at its Ferrara plant, southwest of Venice. This shows the solvent recovery unit at the polypropylene-resin plant.

million-pound-annually naphthalene plant at Los Angeles.

At the time this survey was completed there had been no announced plans for new olefin, polyolefin, or synthetic-rubber projects.

Australasia

This large geographical grouping covers the countries: Australia, Egypt, Formosa, India, Indonesia, Iran, Iraq, Israel, Japan, Korea, Kuwait, Malaya, Pakistan, Southern Rhodesia, and Union of South Africa.

Six of the above countries are presently planning their first petrochemical plant. And Egypt, Kuwait, and Southern Rhodesia are making their initial appearance in the survey.

Construction is really booming in this area with 80 projects under way or planned. This compares with 50 in last year's survey. Over half of the building is taking place in Japan, followed by India, Australia, and Pakistan.

Australia has become more diversified in its petrochemical production with several olefin and synthetic rubber plants coming on stream this year. Thirteen petrochemical plants are now existing and six building projects are presently planned or under way.

Two of the larger projects are Imperial Chemical's plastics and fertilizer plant at Botany, New South Wales, and Shell Chemical's ethylene plant at Clyde, New South Wales. Ethylene from the Shell plant will be used to make polyethylene at the Imperial plant at Botany.

India has started off its third five-year plan with a rash of plans for new petrochemical plants to manufacture fertilizer, synthetic rubber, plastic resins, and carbon black. The country presently has 5 plants and plans for 15 new projects. Six of the new projects will be for the production of fertilizer.

A contract has been recently awarded for India's first synthetic-rubber plant to be built at Bareilly, in the State of Uttar Pradesh.

Japan is entering its second 5-year plan with real enthusiasm. Petrochemical-construction projects are at an all-time high with 49 now planned or under way. Last year, the survey showed only 26 new-construction projects.

The first 5-year program was completed last year with the establishment of four major refining-petrochemical complexes representing a total investment of $228 million.

As a big part of Japan's second 5-year plan, construction is now under way on the big complexes of Dai Kyowa Petrochemical Co. at Yokkaichi, Maruzen Petrochemical Co. at Goi, and Tonen Petrochemical Co. at Kawasaki. Still in the planning stage are two other large complexes: Idemitsu Kosan K.K. at Tokuyama and Mitsubishi Kasei Kogyo K.K. at Mizushima.

Canada

New petrochemical projects in Canada show a big decrease this year. Last year's survey listed 21 new plants or expansions in the planning or construction stage compared to 15 in the present survey.

Sulfur-recovery units being built in conjunction with gas-processing facilities in western Canada account for six of the new building projects. It appears that Canada will be plagued with an excess of sulfur for at least the next 5 years.

In eastern Canada, British American and Imperial Oil have plans for producing aromatics, Dow will expand facilities for polyolefins, and Polymer Corp. will increase its synthetic rubber capacity.

Latin America

The number of reported petrochemical projects in this area has increased from 25 at this time last year to 31 at present. Argentina, Brazil and Mexico are showing the most activity.

Emphasis in the larger countries seems to be on facilities for making olefins and polyolefins, while in the smaller, more under-developed countries the emphasis is on ammonia and fertilizer plants.

Argentina presently has seven new petrochemical construction projects planned or under way. Among the largest of these is a complex being built at a cost of $70 million by a group composed of Fish International Corp., Continental Oil Co., Cities Service Co., U. S. Rubber, and Witco Chemical Co. in Santa Fe Province. A $15-million plant for the production of aromatics is planned by Hydrocarbon-Argentina at San Lorenzo, and Industrias Petroquimicas Argentinas Koppers is building a plant to produce ethylene and polyethylene at Ensenada at a cost of $25.5 million.

Brazil is seeking to reduce its reliance on imported plastics and now has plans for three polyolefin plants. This accounts for half of the six new projects listed for Brazil. Presently under construction by Firestone and Goodyear is a complex near Rio de Janeiro to produce synthetic rubber, olefins, and aromatics.

Mexico's government-owned Petroleos Mexicanos has six new projects planned or under way compared to only one by private interests. This reflects the government's policy to control Mexico's basic industries.

The more important projects that Pemex has already awarded contracts for are: Facilities at Ciudad Madero for producing dedecylbenzene, butadiene, styrene, and SBR copolymer; plants at Minatitlan for ammonia and aromatics; and a small complex at Coatzacoalcos to produce ethyl chloride, ethylene dichloride, vinyl chloride, and acetaldehyde.

Western Europe

Construction is down slightly in Europe's petrochemical industry according to this year's survey. Last year a total of 91 new projects was reported as planned or under way compared to only 85 in this latest tally. However, this is only eight fewer than the number of projects listed for the U. S. Last year this difference was 17.

Even though reported new projects are down, actual petrochemical production is rising rapidly and should continue this trend through at least 1965. This is indicated by the accompanying production data on France, West Germany, Italy, and the United Kingdom.

Of the four largest petrochemical-producing countries, the survey showed that France has announced 12 new projects, Italy 18, West Germany 13, and the United Kingdom 19.

France will have invested about $350 million in its petrochemical industry by the end of 1961. The table below will give some idea as to the expected future growth of some of the major products.

FRANCE
Petrochemical Production
(million pounds unless noted)

Product—	1959	1965 (est.)
Ethylene	130	600
Propylene	195	350
Benzene	20	300
Polyethylene	39	300
Polypropylene	0	60
Synthetic rubber	*65,000	*200,000

*Metric tons

Two new plants have been announced for the production of one of the new synthetic "natural" rubbers. Firestone France will build a unit to produce polybutadiene at Port Jerome, and SES has a similar plant in the design stages at Berre. Aromatics are also in great demand in France so Esso Standard is building an extraction unit at Port Jerome, and SNPA has plans for a hydrodealkylation unit at Lacq.

Germany's petrochemical industry will represent approximately $500 million in investment by the end of this year and could reach as much as $1,500 million by 1965. The large production increases shown in the accompanying table are due in a big part to replacement of coal-derived raw materials with petroleum-based products.

GERMANY (West)
Petrochemical Production
(1,000 tons of carbon content)

1959	1960	1962 (est.)
362	670	1,020

The largest projects planned or under way in West Germany are facilities for producing basics such as olefins and aromatics, BP Benzin und Petroleum and Deutsche BP und California both have aromatics projects listed for Dinslaken, and Gelsenberg Benzin has a benzene unit under way at Gelsenkirchen-Horst. Also, both Esso and Rheinsche Olenfinwerke have ethylene plants under way at Cologne.

Italy began a concentrated 3-year investment program in 1960 that will result in total capital expenditures in the petrochemical industry of around $275 million by the year's end. This is expected to reach almost $400 million by the end of the 1962. The table below shows the expected production results from this big expenditure.

ITALY
Petrochemical Production
(1,000 tons of carbon content)

1959	1960	1962 (est.)
180	270	500

The huge $95 million complex being built by Montecatini at Brindisi is scheduled for completion early next year and will produce olefins, polyolefins, alcohols, synthetic rubbers, and other chemicals. ENI also has a complex under way at Gela, Sicily to produce plastics, fertilizers, solvents, and other chemicals.

United Kingdom's investment in facilities to produce organic petrochemicals is estimated to reach $465 million by the end of this year and climb up to $555 million during 1962. Not included in these investment figures or in the table of production are facilities for making ammonia, carbon black and sulfur.

UNITED KINGDOM
Petrochemical Production
(organic) (1,000 metric tons)

1959	1960	1962 (est.)
595	750	1,400

Two new complexes are scheduled in this country: British Hydrocarbon Chemicals has plans for a $28-million development at Baglan Bay, South Wales, and Imperial Chemicals has long-range plans for a $40 million complex near Avonmouth, England.

SPREADING OVER the plains of West Texas is this Cosden Petroleum Corp. petrochemical plant in Big Spring. The plant makes such products as aromatics, styrene, polystyrene, polybutene, and chemical polymers. Scheduled for completion this year are additional facilities for metaxylene.

THE OIL AND GAS JOURNAL'S

1961 survey of U. S. petrochemical plants

MORE THAN 190 companies are manufacturing or will soon be manufacturing petrochemical products in the United States.

The Oil and Gas Journal's ninth annual petrochemical survey lists more than 400 operating petrochemical plants in the U. S. About 90 new construction or expansion programs are under way or planned with the Gulf Coast the busiest area.

This plant-by-plant listing of U. S. plants and construction programs is followed by the latest survey of petrochemical plants in the free world outside the U. S. Figures are capacities, and the dot symbol indicates construction. Addresses are company headquarters.

AIR PRODUCTS, INC. (for oxo-alcohols construction project see Tidewater Oil Co-Air Products listing.)

ALLIED CHEMICAL CORP., 61 Broadway, New York 6, N. Y.

Plant: General Chemical Division, Bayonne, N. J.
Product: Sulfur from refinery gas (30 tons per day), and fluorocarbon (35,000,000 lb. per year).

Plant: General Chemical Division, Richmond, Calif.
Product: Sulfur from refinery gas (100 long tons per day).

Plants: National Aniline Division, Buffalo, N. Y., and Moundsville, W. Va.
Raw material: Kerosine fraction, white oil fraction, benzene, toluene, xylene, and natural gas.
Products: Alkyl aryl sulfonates (water soluble), long-chain alkyl aryl sulfonates (oil soluble), dodecylbenzene, aniline, maleic anhydride, fumaric acid, diisocyanates, dyestuffs, nitrotoluenes, and toluidines.

Plant: Nitrogen Division, Hopewell, Va.
Raw material: Natural gas.
Products: Ammonia (1,100 tons per day), ammonium nitrate-limestone, pebbled ammonium nitrate, nitrogen solutions, sodium nitrate, and nitrogen tetroxide.

Plant: Nitrogen Division, La Platte, Neb.
Raw material: Natural gas.
Products: Ammonia (210 tons per day), urea (300 tons per day), and nitrogen solutions.

Plant: Nitrogen Division, Orange, Tex.
Raw material: Ethylene.
Products: Low-weight and high-density polyethylene, ethylene glycol, polyglycols, ethylene oxide, and ethanolamines.

Plant: Nitrogen Division, South Point, Ohio.
Raw material: Natural gas.
Products: Ammonia (875 tons per day), urea (300 tons per day), nitrogen solutions, methanol, formaldehyde, urea-formaldehyde concentrate, and melamine (10,000 tons per year).

Plant: Plastics Division, Frankford, Pa.
Raw material: Propane-propylene blend.
Products: Phenol and acetone.

Plant: Plastics Division, Tonawanda, N. Y.
Raw material: Ethylene.
Products: Polyethylene resin pipe compound and high-melting-point polyethylene wax. (Polyethylene capacity here is reportedly 20,000,000 lb. per year.)

Plant: Solvay Process Division, Moundsville, W. Va.
Raw material: Methane (natural gas).
Products: Ultrapure methane (99.99%), methyl chloride, methylene chloride, chloroform, and carbon tetrachloride.

Plant: Solvay Process Division, Baton Rouge, La.
Raw material: Propylene oxide.
Product: Polyethers (20,000,000 lb. per year).

ALOX CORP., Box 556, Niagara Falls, N. Y.

Plant: Niagara Falls.
Raw material: Petroleum fractions.
Products: Oxygenated petroleum chemicals for rust preventives, lube-oil additives, mixtures of organic acids, and other oxygenated hydrocarbons.

AMERICAN CHEMICAL CORP. (Richfield Oil Corp. and Stauffer Chemical Co.), 2112 E. 223 St., Long Beach 10, Calif.
Plant: Long Beach, Calif.
Products: Ethyl chloride (50,000,000 lb. per year), ethylene dichloride (15,000,000 lb.), and vinyl chloride monomer (25,000,000 lb. per year). Ethylene dichloride primarily used as raw material for vinyl chloride monomer.

AMERICAN CYANAMID CO., 30 Rockefeller Plaza, New York 20, N. Y.
Plant: Fortier plant, Avondale, La.
Raw material: Natural gas.
Products: Hydrocyanic acid, acrylonitrile (100,000,000 lb. per year), acetylene, ammonia (150 tons per day), and ammonium sulfate.
• Construction: Scheduled on stream in 1963 are facilities with capacity of 30,000,000 to 35,000,000 lb. per year of methyl methacrylate monomer. Principal raw material will be hydrocyanic acid.
Plant: Santa Rosa, Fla.
Product: Acrylic fiber (27,000,000 lb. per year).
Plant: Warners, N. J.
Raw material: Petroleum fractions.
Product: Oil-layer type of petroleum sulfonate (barium salt).

AMERICAN-MARIETTA CO., 3400 13 Ave. SW, Seattle 4, Wash.
Plants: Portland, Ore.; Richmond, Calif.; Newark, Ohio; Edmonton, Alta.; and New Westminster, B. C.
Raw material: Phenol, formaldehyde, urea, and caustic.
Product: Synthetic resins (125,000,000 lb. per year).

AMERICAN OIL CO., 910 S. Michigan Ave., Chicago 80, Ill.
Plant: El Dorado, Ark.
Raw material: Refinery streams.
Product: Polybutenes.
Plant: Sugar Creek, Mo. (formerly listed as Standard Oil Co. of Indiana).
Raw material: Petroleum fractions.
Products: Heptane concentrate and sodium cresylate.
Plant: Texas City, Tex.
Raw material: Refinery streams.
Products: Benzene, nonene, heptene, and aromatic solvents.
Plant: Whiting, Ind. (formerly listed as Standard Oil Co. of Indiana).
Raw material: Petroleum fractions.
Products: Benzene-1°, nitration-grade toluene and xylenes-10°, acid-layer-type petroleum sulfonate, sodium cresylate, petroleum-base plasticizers, and sulfur from refinery gas.
Plant: Wood River, Ill. (formerly listed as Standard Oil Co. of Indiana).
Raw material: Heptene and nonene from olefin feed.
Products: Isooctyl, decyl or higher alcohols.
Raw material: Petroleum fractions.
Products: Polybutene and high-molecular weight hydrocarbons, lube-oil detergent and corrosion-inhibitor additives, gasoline and distillate-fuel additives, and sodium cresylate.
Plant: Yorktown, Va.
Raw material: Refinery streams.
Products: Polybutenes and sulfur (50 tons per day).
• Construction: Scheduled for completion January 1962 are facilities to produce heptene from refinery streams.

AMERICAN RUBBER & CHEMICAL CO. (owned by American Synthetic Rubber Corp., Box 360, Louisville, Ky., and Stauffer Chemical Co.).
Plant site: Louisville, Ky.
• Construction: New facilities, with initial capacity of 30,000 long tons per year of polyisoprene and polybutadiene scheduled for completion September 1961. With modifications, this could be increased to 50,000 tons.

AMERICAN SYNTHETIC RUBBER CORP., Box 360, Louisville, Ky.
Plant: Louisville.
Product: SBR copolymer (75,000 tons per year).

AMOCO CHEMICALS CORP., 130 E. Randolph Drive, Chicago 1, Ill.
Plant: Joliet, Ill.
Raw material: Petroleum aromatics.
Products: Phthalic anhydride, isophthalic acid, terephthalic acid, dimethyl terephthalate, dimethyl isophthalate, and benzoic acid.
• Construction: Semiworks for production of trimellitic anhydride scheduled for completion in 1961.
Plant: Texas City, Tex.
Raw material: Petroleum fractions and refinery gases.
Products: Benzene-2° (1,000 bbl. per day), toluene, xylenes, hydrocarbon resins (petroleum polymer and condensation resins), aromatic solvents, drying oils, alkylated naphthalenes, nonene, and methyl mercaptan.
• Construction: New facilities for production of petroleum resins will be completed here late 1961.

ANCON CHEMICAL CORP. (formed by Continental Oil Co., Box 2197, Houston 1, Tex., and Ansul Chemical Co., 1 Stanton St., Marinette, Wis.).
Plant site: Lake Charles, La.
• Construction: Scheduled for completion early 1962 are facilities to produce 60,000,000 lb. per year of methyl chloride. Blaw-Knox Co. is contractor. Plant will cost more than $1 million.

ANLIN CO. OF ILLINOIS, 3813 Buffalo Speedway, Houston, Tex.
Plant: Wood River, Ill.
Product: Sulfur from refinery (150 tons per day).

ANLIN CO. OF NEW JERSEY, Perth Amboy, N. J.
Plant: Perth Amboy.
Product: Sulfur from refinery (35 tons per day).

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APACHE POWDER CO., Benson, Ariz.
Plant: Curtiss, Ariz.
Raw material: Natural gas.
Products: Anhydrous ammonia (30 tons per day), nitric acid, ammonium nitrate, and sulfuric acid (80 tons per day).

ARKANSAS LOUISIANA CHEMICAL CORP., Box 1734, Shreveport, La.
Plant: Hamilton gas-processing plant, Columbia County, Arkansas.
Product: Sulfur from natural gas (3 tons per day).

ARMOUR AGRICULTURAL CHEMICAL CO., Nitrogen Division, Box 128, Crystal City, Mo.
Plant: Crystal City.
Raw material: Natural gas.
Products: Ammonia (200 tons per day), nitric acid (240 tons per day), ammonium nitrate (200 tons per day), and ammonia solutions.
Plant site: Cherokee, Ala.
• Construction: Work is under way at a new plant with capacity for 360 tons per day of ammonia, 50 tons of urea, 300 tons of nitric acid, 250 tons of ammonium nitrate, 500 tons of ammonium phosphate, and 250 tons per day of nitrogen solution. Completion due early 1962. Raw material will be natural gas.

ASHLAND OIL & REFINING CO., 1401 Winchester Ave., Ashland, Ky.
Plant: Catlettsburg, Ky.
Raw material: Naphtha fraction.
Products: Naphthalene (75,000,000 lb. per year), benzene (4,000,000 gal. per year), toluene (6,000,000 gal.), and xylene (6,000,000 gal. per year).

ATLANTIC REFINING CO., 260 S. Broad St., Philadelphia 1, Pa.
Plant: Atreco, Tex.
Raw material: Petroleum fractions, refinery gases, and solvent extracts.
Products: Detergent alkylate (from benzene and propylene tetramer), and cresylic acid.
Plant: Nederland, Tex.
Raw material: Reformate.
Products: Benzene, toluene, and xylene.
• Construction: For joint aromatics project with Pure Oil Co. at Smiths Bluff plant in Nederland, see Pure listing.
Plant: Philadelphia.
Raw material: Crude petroleum fractions, refinery gas, and solvent extracts.
Products: Aromatic solvents, diisobutylene, triisobutylene, technical eicosane, alkylbenzene, dodecylbenzene-sulfonic acid-type and water-soluble alkyl aryl sulfonates, sulfuric acid, and ammonia (165 tons per day).
Raw material: Asphalt.
Product: Thermoplastic resin.

ATLAS PROCESSING CO., Box 1786, Shreveport, La.
Plant: Shreveport.
Raw material: Field condensates and debutanized 400° F. end point naphtha from gas-processing plants.
Product: Benzene (600 bbl. per day).

AURORA GASOLINE CO., 15911 Wyoming Ave., Detroit 38, Mich.
Plant: Detroit.
Raw material: Naphtha fraction and refinery gas.
Products: Sulfur (27 tons per day) and mixed aromatics (3,850 bbl. per day).

• Construction: Under way are facilities to supply Dow Chemical Co.'s Bay City plant with about 20,000,000 gal. per year of aromatics. Completion late 1961.

AVISUN CORP. (Sun Oil Co. and American Viscose Corp.), 1345 Chestnut St., Philadelphia 7, Pa.
Plant: Facilities leased from Koppers Co., Inc., at Port Reading, N. J.
Raw material: Olefins.
Product: Polypropylene resins (125,000,000 lb. per year).
Plant site: New Castle, Del.
• Construction: AviSun will complete a 100,000,000-lb. per year polypropylene resin plant here third quarter 1961.

BARNHART HYDROCARBON CORP. (See Northwest Production Corp. for Barnhart field, Texas, sulfur recovery.)

BORDEN CO., Chemical Division, 350 Madison Ave., New York 17, N. Y.
Plant: Fremont, Calif. (near San Francisco).
Raw material: Urea and methanol.
Products: Resin and formaldehyde. (Capacity of plant 90,000,000 lb. per year.)
Plant: Illiopolis, Ill.
Raw material: Vinyl chloride monomer.
Product: Polyvinyl chloride (40,000,000 lb. per year).
Plant: Leominster, Mass.
Raw material: Vinyl chloride monomer.
Products: Polyvinyl alcohol, butadiene, and styrene. (Plant capacity is 12,000,000 lb. per year.)
Plant site: Geismar, La.
• Construction: Scheduled for completion in 1962 are facilities for production of vinyl acetate (50,000,000 lb. per year of monomer) and methanol (25,000,000 gal. per year). These facilities, to cost about $20 million, will be wholly owned by Borden and will be adjacent to the Monochem facility, partially owned by Borden. United Engineers & Constructors, Inc., has contract.

CABOT CORP., Box 1101, Pampa, Tex.
Plants: Big Spring and Pampa, Tex., and Franklin and Ville Platte, La.
Raw material: Combined gas throughput of 53,000 M.c.f.d. and oil throughput of 6,200 bbl. per day.
Product: Carbon black (furnace process).
Plant: Skellytown, Tex.
Raw material: Throughput 40,000 M.c.f.d. of gas.
Product: Carbon blacks (channel process).

CALCASIEU CHEMICAL CORP., operated by Petroleum Chemicals, Inc., Box 1522, Lake Charles, La.
Plant: Lake Charles, La.
Raw material: Ethylene.
Products: Ethylene glycol (11,000,000 gal. per year) and glycol sludge (775,000 gal. per year).

CALIFORNIA CHEMICAL CO., ORONITE DIVISION — industrial chemicals—(subsidiary of Standard Oil Co. of California), 200 Bush St., San Francisco, Calif.
Plant: Anaheim, Calif.
Raw material: Dibasic acids and solvents.
Products: Alkyd and polyester resins.
Plant: El Paso, Tex. (at Standard Oil Co. of Texas refinery).
Raw material: Petroleum-base stocks and natural gas.
Product: Heptenes.
Plant: El Segundo, Calif. (at Standard of California Western Operations, Inc., refinery).
Raw material: Petroleum-base stocks.
Products: Benzene, toluene, paraxylene, cumene, butadiene, and butylene.
Plant: Oak Point, La.
Raw material: Petroleum-base stocks.
Products: Lube-oil additives, furnace-oil additive, gas odorants, nonionic detergents, algicides, alkyl phenols, grease additive, diesel-fuel additive, and high-temperature hydraulic fluid.
Plant: Richmond, Calif. (at Standard of California Western Operations, Inc., refinery).
Raw material: Petroleum-base stocks and natural gas.
Products: Orthoxylene, metaxylene, paraxylene, industrial xylenes, alkyl aromatic detergent intermediates, metallic naphthenates, naphthenic acids, cresylic acids, petroleum sulfonates, polybutenes, gas odorants, ethyl mercaptan, isophthalic acid, terephthalic acid, maleic anhydride, phthalic anhydride, phenol, and acetone.
• Construction: New facilities for fumaric acid. Also, capacity for orthoxylene, paraxylene, and polybutenes will be increased.

CALIFORNIA CHEMICAL CO., ORTHO DIVISION — agricultural chemicals — (subsidiary of Standard Oil Co. of California), Lucas St. and Ortho Way, Richmond, Calif.
Plant: Kennewick, Wash.
Products: Pelleted fertilizers, nitric acid, and ammonium nitrate prills.
Plant: Richmond, Calif.
Raw material: Natural and refinery gases and petroleum bases.
Products: Ammonia, nitric acid, ammonium sulfate, ammonium nitrate, fertilizer solutions, pelleted fertilizers, summer and winter oil sprays, aromatic solvents, spray detergents, and emulsifiers.
Plant site: Fort Madison, Iowa.
• Construction: Facilities to manufacture ammonia, pelleted fertilizers, and ammonium nitrate prills.

CALLERY CHEMICAL CO., Box 1452, Muskogee, Okla.
Plant: Muskogee.
Raw material: Natural gas and boric acid.
Product: Pentaborane for the Air Force.

CALUMET NITROGEN PRODUCTS CO., Box 5910-A, Chicago 80, Ill.
Plant: Hammond, Ind.
Raw material: Hydrogen-rich refinery gas.
Products: Anhydrous ammonia, aqua ammonia, and solutions (300 tons per day).

CARBON BLACKS, INC., Box 236, Rayville, La.
Plant: Rayville.
Product: High-grade color blacks—roller process—(120,000 lb. per year).

CARIBE NITROGEN CORP. (W. R. Grace & Co., 7 Hanover Square, New York 5, N. Y.).
Plant: Guanica, Puerto Rico.
Products: Sulfuric acid and ammonium sulfate.

CARWIN CO., Stiles Lane, North Haven, Conn.
Plant: La Porte, Tex.
Raw material: Amines.
Product: Isocyanates.

CARY CHEMICALS, INC., Box 38, East Brunswick, N. J.
Plant: Flemington, N. J.
Raw material: Vinyl chloride.
Products: Polyvinyl chlorides and copolymers (50,000,000 lb. per year).
• Construction: Expanding to 200,000,000 lb. per year of vinyl polymer production, with completion by 1965.

CELANESE CHEMICAL CO., Division of Celanese Corp. of America, 180 Madison Ave., New York 16, N. Y.
Plant: Bishop, Tex.
Raw material: Natural gas and liquefied petroleum gases (propane and butanes).
Products: Propylene oxide, propylene glycol, dipropylene glycol, 1,3-butylene glycol, 2,3-butylene glycol, acetone, methanol, formaldehyde, formaldehyde solutions in alcohols, paraformaldehyde, trioxane, acetaldehyde, acetic acid, n-propanol, isobutanol, n-butyl alcohol, special solvents, n-propyl acetate, pentaerythritol, butyraldehyde, 2-ethyl butanol, crotonaldehyde, and trimethylolpropane.
• Construction: Facilities are being built for commercial production of Celanese's new polyacetal resin.
Plant: Houston, Tex.
Raw material: Ethylene and alpha olefins.
Product: Low-pressure polyolefins (50,000,000 lb. per year).
Plant: Pampa, Tex.
Raw material: Natural gas, propane, and butanes.
Products: Propionic acid, methanol, acetone, acetic acid (240,000,000 lb. per year), acetic anhydride, vinyl acetate, n-propyl acetate, n-butyl acetate, butyric acid, methyl acetone, acetate methylal, methyl ethyl ketone, and ethyl acetate, ethyl acrylate and methyl acrylate (13,000,000 lb. per year), 2-ethylhexyl, butyl acrylate, and glacial acrylic acid.
Plant: Point Pleasant, W. Va.
Raw material: Petroleum cresylic acid, phenol, propyl alcohol, ethylene oxide, butyl alcohol, isooctyl alcohol, and pentaerythritol.
Product: Tricresyl phosphate, chlorinated phosphates, and fire-resistant functional fluids.
Plant site: Bay City, Tex.
• Construction: Facilities being built for manufacture of acetaldehyde from ethylene by the Aldehyd, G.m.b.H., process. Also, expanded facilities are being built for production of 2-ethylhexanol to replace those at Bishop, Tex. Completion 1962.

CHEMOIL CORP., 719 Carondolet Building, New Orleans 12, La.
Plant site: Between Baton Rouge and New Orleans.
• Construction: Plans call for a new refinery, with output to include such petrochemicals as ethylene and propylene.

CHEMSTRAND CORP., 350 Fifth Ave., New York 1, N. Y.
Plant: Pensacola, Fla.
Raw material: Petroleum-base stocks.
Product: Nylon.

CITIES SERVICE REFINING CORP., Box 1562, Lake Charles, La.
Plant site: Lake Charles.
• Construction: Facilities to produce 120,-

000,000 lb. per year of orthoxylene. Raw material for feed stock to the orthoxylene-purification unit is reformate from a fluid hydroformer. Other products to include a highly paraffinic raffinate and a mixture of toluene, ethylbenzene and meta- and paraxylenes. Cities Service Refining has approval to construct facilities to produce 100,000,000 lb. per year of polymer-grade high-purity propylene. Completion scheduled early summer 1962. Raw material will be propane-propylene stream from catalytic cracking.

COLLIER CARBON & CHEMICAL CORP., Petroleum Building, 714 W. Olympic Boulevard, Los Angeles 15, Calif.
Plant: Brea, Calif.
Raw material: Natural gas.
Products: Ammonia (320 tons per day), dry ice and liquid CO_2 (165 tons per day), ammonium nitrate, ammonium phosphate, and nitric acid.
Plants: Los Angeles, Santa Maria, and Oleum, Calif.
Raw material: Hydrogen sulfide.
Product: Molten sulfur.
Plant: Los Angeles (harbor area).
Raw materials: Hydrogen sulfide, sulfur, and spent alkylation acid.
Products: Sulfuric acid and ammonium sulfate.
Plants: Santa Clara, Contra Costa County, and Santa Maria, Calif.
Raw material: Petroleum coke.
Products: Industrial carbons, calcined carbon, and green petroleum coke.
Plant site: Delaware City, Del.
• **Construction:** (For new facilities to produce naphthalene in joint venture with Tidewater Oil Co., see Tidewater-Collier listing.)

COLTEXO CORP., 380 Madison Ave., New York, N. Y.
Plant: Lefors, Tex. Throughput 32,000 M.c.f.d. of gas.
Product: Carbon black (channel process).

COLUMBIA HYDROCARBON CORP., subsidiary of Columbia Gas System, Inc., 120 E. 41 St., New York 17, N. Y.
Plant site: Siloam, Ky.
• Construction: Planning ethylene production facilities to be added to existing fractionation plant, which is fed by hydrocarbons from United Fuel Gas Co.'s Kenova, W. Va., extraction plant.

COLUMBIA-SOUTHERN CHEMICAL CORP. (See Pittsburgh Plate Glass Co.)

COLUMBIAN CARBON CO., 380 Madison Ave., New York 17, N. Y.
Plants: Eunice, N. M., and Coltexo, Seagraves, and Sweeny, Tex.
Product: Carbon black (channel process).
Plants: Conroe and Seagraves, Tex.; Eola and North Bend, La.; El Dorado, Ark.; and Hickok, Kans.
Product: Carbon black (furnace process).
• Construction: At North Bend, La., an additional unit to the existing carbon-black plant will be completed fall 1961, at a cost of more than $2 million.
Plant: Gray County, Texas (throughput of 12,000 M.c.f.d.), operated by the company's Peerless Carbon Black Division.
Product: Carbon black (roller process).
Plant: Seminole field, Gaines County, Texas.
Product: Sulfur from natural gas (28 tons per day).

COMMERCIAL SOLVENTS CORP., 260 Madison Ave., New York 16, N. Y.
Plant: Sterlington, La.
Raw material: Hydrogen and carbon monoxide.
Product: Methanol.
Raw material: Natural-gas fractions.
Products: Nitroethane, nitromethane, 1-nitropropane, 2-nitropropane, and nitrobutane.
Raw material: Natural gas.
Products: Ammonia (400 tons per day), ammonium nitrate, and nitrogen solutions.

CONTINENTAL CARBON CO., 4848 Guiton, Houston 27, Tex.
Plants: Eunice, N. M.; Lake Charles, La.; Ponca City, Okla.; Sunray, Tex.; and Bakersfield, Calif.
Product: Carbon black.

CONTINENTAL OIL CO., Box 2197, Houston 1, Tex.
Plant: Baltimore, Md.
Raw material: Propylene tetramer and benzene.
Products: Alkyl aryl sulfonating stocks including dodecylbenzene.
Plant: Chicago.
Raw material: Dodecylbenzene.
Products: Water-soluble surface-active sulfonates including liquid, slurried, drum-dried, and spray-dried stocks (dodecylbenzenesulfonic acid type) and oil-well fracturing compounds.
Plant: Lake Charles, La.
Raw material: Naphtha fraction.
Products: Benzene (300 bbl. per day) and toluene-xylenes mix (1,600 bbl. per day).
Raw material: Propylene.
Product: Propylene tetramer.
• Construction: New facilities to produce 50,000 tons per year of straight-chain primary alcohols from ethylene will be completed in 1961. For new methyl-chloride project at Lake Charles, see listing for Ancon Chemical Corp.
Plant: Ponca City, Okla.
Raw material: Naphtha fraction.
Products: Benzene (350 bbl. per day) and toluene-xylenes mix (1,200 bbl. per day).
Raw material: Propylene.
Product: Propylene tetramer.
Raw material: Benzene.
Product: Cyclohexane (65,000 tons per year).
Plant: Trainer, Pa.
Raw material: Alkyl aryl sulfonating feed stock.
Products: Oil-soluble surface-active sulfonates (lubricating-oil detergent additive and fuel-oil additives).

COOPERATIVE FARM CHEMICALS ASSOCIATION, Box 80, Lawrence, Kans.
Plant: Lawrence.
Raw material: Natural gas.
Products: Ammonia (420 tons per day), ammonium nitrate prills (450 tons per day), nitrogen solutions, and urea nitrate solutions (100 tons per day), and 100% urea (100 tons per day).
• Construction: Scheduled for completion late fall 1961 are facilities to increase nitric-acid production to 480 tons per day and nitrate facilities from present capacity of 450 tons to 600 tons per day.

COPOLYMER RUBBER & CHEMICAL CORP., Box 2591, Baton Rouge 1, La.
Plant: Baton Rouge.
Raw material: Petroleum derived.
Products: Butadiene (55,000 short tons per year) and SBR rubbers and latices (with total plant capacity of 95,000 long tons per year net or 133,000 long tons per year gross production).

COSDEN PETROLEUM CORP. (subsidiary of W. R. Grace & Co.), Box 1311, Big Spring, Tex.
Plant: Big Spring.
Raw material: Naphtha fractions.
Products: Benzene (600 bbl. per day), toluene (1,000 bbl. per day), total xylenes (800 bbl. per day, including 99%-purity orthoxylene, 80%-purity metaxylene, mixed xylenes, ethylbenzene, and paraxylene), styrene monomer (70,000,000 lb. per year), and polystyrene (40,000,000 lb. per year).
Raw material: Mixed olefins.
Products: Polybutene (2,400,000 gal. per year) and chemical polymers (3,500,000 gal. per year).
• Construction: Scheduled for completion last half 1961 are facilities for 95%-purity metaxylene from mixed xylene. Capacity of this project will be 3,000,000 lb. per year.

CROWN CENTRAL PETROLEUM CORP., American Building, Baltimore, Md.
Plant: Pasadena, Tex.
Raw material: Refinery gas stream.
Product: Propane-propylene stream (sold to Shell Chemical Corp.).
• Construction: Scheduled for completion mid-1961: facilities for 17,000,000 gal. per year of benzene.

JOHN DEERE CHEMICAL CO., Division of Deere & Co., Box 1417, Pryor, Okla.
Plant: Pryor.
Raw material: Natural gas.
Products: Ammonia (200 tons per day), urea (90,000 tons per year), and nitrogen solutions.
Plant: Tulsa, Okla.
Raw material: Phosphate rock, sulfur, ammonia, and potash.
Products: Mixed fertilizers (60,000 tons per year).

DELHI-TAYLOR OIL CORP., Fidelity Union Tower, Dallas 1.
Plants: Corpus Christi, Port Isabel, and McAllen, Tex.
Raw materials: Selected petroleum fractions.
Products: Benzene (2,500 bbl. daily), toluene (1,000 bbl.), xylene (900 bbl.), orthoxylene (450 bbl.), resin former, aliphatic solvents, and heavy aromatic solvents. (Capacity of extraction unit is 9,000 bbl. per day.)

DIAMOND ALKALI CO., Union Commerce Building, Cleveland 14, Ohio.
Plant: Belle, W. Va.
Product: Chlorinated methanes.
Plant: Deer Park, Pasadena, Tex.
Raw material: Ethylene.
Products: Perchlorethylene, vinyl chloride polymer, vinyl chloride monomer (50,000,000 lb. per year), and polyvinyl chloride.
• Construction: New facilities for 40,000,000 lb. per year of acetylene from methane and oxygen will be completed in January 1962. Scheduled for completion February 1962 are facilities for

ammonia. Capacity will be 100 tons per day.
Plant: Painesville, Ohio.
Products: Chlorinated paraffins.
Plant: Greens Bayou, Pasadena, Tex.
Raw material: Benzene.
Products: Benzene hexachloride and DDT. (C12 xylenes from paraxylenes are being produced on a semicommercial basis.)

DIXON CHEMICAL INDUSTRIES, INC., 1260 Broad St., Bloomfield, N. J.
Plant: Paulsboro, N. J.
Raw material: Oil refinery sludge.
Product: Sulfuric acid (350,000 tons per year).

DOW BADISCHE CHEMICAL Co. (owned jointly by Badische Anilin- and Soda-Fabrik, AG, and Dow Chemical Co., Midland, Mich.).
Plant: Freeport, Tex.
Raw material: Acetylene.
Products: Acrylic acids and methyl, ethyl, butyl and other acrylic esters.
• Construction: Scheduled for completion in January 1962 are facilities to produce 40,000,000 lb. per year of caprolactam.

DOW CHEMICAL CO., Midland, Mich.
Plant: Allyn's Point, Conn.
Raw material: Styrene and butadiene.
Products: Polystyrene, styrofoam, and latex.
Plant: Bay City, Mich.
Products: Ethylene, butadiene, polyethylene, and benzene.
Plant: Dow's Saginaw Bay Division at Bay City, Mich.
Raw material: Ethylene, butadiene, propylene.
Products: Linear polyethylene, polypropylene, and others.
Plant: Freeport, Tex.
Raw material: Natural gas, LPG, and benzene.
Products: Ethylene diamine; mono, di, tri, -ethanolamines; glycerin; ethylene and propylene oxides; ethylene, -propylene, -diethylene, -dipropylene, tetraethylene, -triethylene, -tripropylene glycols; carbon tetrachloride; chloroform; dichlorethyl, -dichloroisopropyl ether; ethyl benzene; ethyl, -methyl, -methylene chlorides; vinyl, -vinylidene chlorides; ethylene, -ethylidene, -propylene dichlorides; methyl chloroform; perchlorethylene; styrenebutadiene latex; polyethylene; trichloroethylene; allyl alcohol and allyl chloride; epichlorohydrin; epoxy resins, and benzene. Dow has combined capacity of 30,000 short tons per year of butadiene and 800,000,000 lb. per year of styrene at the Freeport, Tex., and Midland, Mich., plants.
Plant: Ironton, Ohio.
Raw material: Styrene.
Products: Polystyrene and styrofoam.
Plant site: Kalama, Wash.
• Construction: Phenol (36,000,000 lb. per year) will be produced from toluene at this new plant when completed third quarter 1961.
Plant: Midland, Mich.
Raw material: Crude oil, natural gas, and benzene.
Products: Ethylene; propylene; styrene; methyl styrene; ethyl benzene; ethyl chloride; ethylene dibromide; diethylbenzene; polystyrene; divinylbenzene; mono-, di-, -tri ethanolamines; i-propylbenzene (cumene); i-propyl chloride; propylene oxide; propylene dichloride; i-propanolamines; toluene-2°; polyglycols; glycol ethers; styrene-butadiene latex; polyvinyl chloride; vinyl-toluene; and vinylidene chloride polymer. The Midland and Freeport, Tex., plants have combined capacity of 30,000 short tons per year of butadiene and 800,000,000 lb. per year of styrene.
Plant: Pevely, Mo.
Raw material: Styrene.
Products: Polystyrene and styrofoam.
Plant: Pittsburg, Calif.
Raw material: Natural gas, styrene, and butadiene.
Products: Methylene chloride, methyl chloride, chloroform, carbon tetrachloride, perchloroethylene, and styrene-butadiene latex.
Plant: Plaquemine, La.
Raw material: LPG.
Products: Ethylene, propylene, glycols, vinyl chloride, polyethylene, vinylidene chloride, methyl chloroform, and other chlorinated hydrocarbons and related products.
• Construction: Scheduled for completion second quarter 1962 is a second polyolefin plant, capable of producing medium and high-density polyethylene, copolymers of ethylene, and polypropylene.
Plant: Torrance, Calif.
Raw materials: Styrene and propylene.
Products: Polystyrene, styrofoam, and polypropylene.
Plant: Williamsburg, Va.
Product: Zefran acrylic fiber (12,000,000 lb. per year).

DU PONT DE NEMOURS & CO., E.I., Wilmington 98, Del.
Plant: Antioch, Calif.
Raw material: Petroleum-base stock.
Products: Tetraethyl lead and fluorinated hydrocarbons.
Plant: Beaumont, Tex.
Raw material: Ethylene, propylene, and cyclohexane.
Products: Chlorosulfonated polyethylene synthetic rubber, menthionine, caprolactum (50,000,000 lb. per year), and acrylonitrile.
Plant: Belle, W. Va.
Raw material: Natural gas.
Products: Urea, methylamines, nylon intermediates, and acrylics.
Plant: Circleville, Ohio.
Raw material: Dimethyl terephthalate and ethylene glycol.
Product: Polyester film.
Plant: Florence, S. C.
Raw material: Dimethyl terephthalate and ethylene glycol.
Product: Polyester film.
Plant: Gibbstown, N. J.
Raw material: Natural gas.
Product: Anhydrous ammonia.
Plant site: Huron, Ohio.
• Construction: Scheduled for completion late 1962 or early 1963 are facilities with capacity of 30,000,000 gal. per year of methanol from natural gas.
Plant: La Porte, Tex.
Raw material: Methanol.
Products: Carbamate fungicides, methylamines, and dimethyl formamide.
Plant: Memphis, Tenn.
Raw material: Natural gas.
Products: Hydrogen cyanide, sodium cyanide, sodium, chlorine, and hydrogen peroxide.
Plant site: Montague, Mich.
• Construction: Scheduled for completion late 1962 are facilities with capacity of more than 50,000,000 lb. per year of acetylene from hydrocarbons.
Plant: Orange, Tex.
Raw material: Natural gas, propane, benzene, cyclohexane, and adiponitrile.
Products: Methanol, polyethylene, nylon intermediates, adipic acid, hexamethylene-diamine. Ethylene made from gas and/or propane is used to make linear polyethylene.
• Construction: New facilities for low-density polyethylene due on stream late 1962. Also scheduled is production of vinyl resins.
Plant: Parkersburg, W. Va.
Products: Acetal, fluorocarbon, acrylic, and nylon resins.
Plant: Victoria, Tex.
Raw material: Natural gas, ethylene, and butadiene.
Product: Adiponitrile (nylon salt basic) and high-pressure polyethylene.

DX SUNRAY OIL CO., Box 381, Tulsa, Okla.
Plant: Duncan, Okla.
Raw material: Refinery gases.
Product: Propylene tetramer.
Plant: Tulsa, Okla.
Raw material: Light Platformate.
Products: Benzene (1,400 bbl. per day) and toluene (650 bbl. per day).

EL PASO NATURAL GAS CO., Box 1161, El Paso, Tex.
Plant: Eunice, N. M.
Product: Sulfur from refinery gas (30 tons per day).

EL PASO NATURAL GAS CO., Box 1161, El Paso, Tex., and **REXALL DRUG & CHEMICAL CO.,** 8480 Beverly Blvd., Los Angeles, Calif.
Plant site: Odessa, Tex.
• Construction: New facilities will handle 150,000,000 lb. per year of ethylene made from ethane and propane, and 120,000,000 lb. per year of high-pressure polyethylene from ethylene, with completion scheduled in January 1962. Facilities will also be built for production of propylene, linear polyethylene, and polypropylene.

ESCAMBIA CHEMICAL CORP., 261 Madison Ave., New York 16, N. Y.
Plant: Pensacola, Fla.
Raw material: Natural gas.
Products: Methanol (20,000,000 gal. per year), polyvinyl chloride (50,000,000 lb. per year), ammonia (200 tons per day), ammonium nitrate, and nitrogen fertilizer solutions.
• Construction: Chemical Construction Corp. has contract for urea-solution plant of 50 tons per day at Pensacola. Ammonia capacity will be increased to 230 tons per day, and methanol capacity will also be increased.
Plant site: Not known.
• Construction: The company has announced that a methacrylic-acid plant will be built.

ETHYL CORP., 100 Park Avenue Building at 41st St., New York 17, N. Y.
Plant: Baton Rouge, La.
Raw material: Ethane and ethylene.
Products: Tetraethyl lead, tetramethyl lead, mixed lead alkyls (chemical and physical mixtures), ethyl chloride, ethylene dichloride, trimethyl phosphate, and vinyl chloride monomer.

Plant: Orangeburg, S. C.
Products: Ortho-alkylated antioxidants for petroleum products, rubber and plastics, aluminum alkyls, and alkyl aluminum halides.
Plant: Pasadena, Tex.
Raw material: Ethylene.
Products: Tetraethyl lead, ethyl chloride, ethylene dichloride, and vinyl chloride monomer.
Plant: Pittsburg, Calif.
Product: Tetraethyl lead.

ETHYL-DOW CHEMICAL CO., INC. (c/o Ethyl Corp., 100 Park Ave. Building at 41st St., New York 17, N. Y.).
Plant: Freeport, Tex.
Raw material: Ethylene.
Product: Ethylene dibromide.

FIRESTONE PLASTIC CO., Division of Firestone Tire & Rubber Co., Akron 17, Ohio.
Plant: Pottstown, Pa.
Raw material: Petroleum-base stocks.
Products: Polybutadiene-acrylonitrile (N-type) acrylic elastomers, polybutadiene-styrene type acrylic elastomers, vinyl resins, and polyvinyl chloride resins.

FIRESTONE SYNTHETIC FIBERS CO., Division of Firestone Tire & Rubber Co., Akron 17, Ohio.
Plant: Hopewell, Va.
Product: Nylon 6.

FIRESTONE TIRE & RUBBER CO., Synthetic Rubber & Latex Division, Akron 17, Ohio.
Plant: Akron.
Product: SBR copolymer (40,000 long tons per year).
• Construction: Capacity is being increased.
Plant: Lake Charles, La.
Product: SBR copolymer (190,000 long tons per year).
Plant: Orange, Tex.
Product: Butadiene (70,000 short tons per year), and facilities for polybutadiene and polyisoprene.

FLETCHER OIL CO., INC., Box 548, Wilmington, Calif.
Plant: Wilmington, Calif.
Product: Sulfur from refinery (7 tons per day).

FOOD MACHINERY & CHEMICAL CORP., 161 E. 42 St., New York 17, N. Y.
Plant: Chemicals & Plastics Division, Nitro, W. Va.
Raw material: Petroleum cresylic acid.
Products: Tricresyl phosphate, plasticizers and diisooctyl phthalate and diallyl phthalate monomer from isooctyl, allyl, and other alcohols.

FOSTER GRANT CO., INC., 289 N. Main St., Leominster, Mass.
Plant: Baton Rouge, La.
Raw material: Benzene and ethylene.
Product: Styrene (180,000,000 lb. per year).
Plant: Leominster, Mass.
Raw material: Styrene monomer.
Products: Polystyrene (75,000,000 lb. per year), styrene acrylonitrile molding powder (6,000,000 lb. per year), and molded articles.
Plant: Manchester, N. H.
Raw material: Caprolactam.
Product: Nylon 6 molding powder (3,000,000 lb. per year).
Plant site: Beaumont, Tex.
• Construction: New facilities for production of polyethylene will be completed fall 1961.

FREEPORT SULPHUR CO., 161 E. 42 St., New York 17, N. Y.
Plant: Westville, N. J.
Product: Sulfur from refinery gas (30 tons per day).

FRONTIER OIL REFINING CO. (Division of Ashland Oil & Refining Co., 1401 Winchester Ave., Ashland, Ky.).
Plant: North Tonawanda, N. Y.
Raw material: Naphtha fraction.
Products: Benzene (300 bbl. per day) and toluene, xylenes, and heavy aromatics (1,500 bbl. per day).

GENERAL ANILINE & FILM CORP., 435 Hudson St., New York 14, N. Y.
Plant: Linden, N. J.
Raw material: Ethylene.
Products: Ethylene oxide (60,000,000 lb. per year) and ethylene glycol (35,000,000 lb. per year).

GENERAL TIRE & RUBBER CO., 1708 Englewood Ave., Akron 9, Ohio.
Plant: Ashtabula, Ohio.
Raw material: Acetylene and HC_1.
Product: Polyvinyl chloride.
Plant: Mogadore, Ohio.
Raw material: Butadiene, styrene, and other petroleum-derived materials.
Products: Butadiene-styrene latices, vinyl pyridene latex, styrene-acrylic latex, polyurethane elastomers, polyurethane prepolymers and activators.
• Construction: Scheduled for completion October 1, 1961, is a stereo-specific synthetic-rubber pilot plant.
Plant: Odessa, Tex. (formerly listed as General Rubber Synthetic Corp.).
Raw material: Butadiene and styrene.
Product: 50,000 long tons per year of copolymer (cold SBR, oil extended; black masterbatch and combinations).

GOLDEN EAGLE REFINING CO., INC., 5150 Wilshire, Los Angeles 36, Calif.
Plant: Torrance, Calif.
Product: Sulfur from refinery (5 tons per day).

GOODRICH CHEMICAL CO., B. F., 3135 Euclid Ave., Cleveland 15, Ohio.
Plant: Akron, Ohio.
Raw material: Petroleum-base stocks.
Product: Butadiene-acrylonitrile (N-type) rubber.
Plant: Avon Lake, Ohio.
Raw material: Alcohols and vinyl chloride.
Products: Plasticizers and polyvinyl chloride resins and compounds.
Plant: Calvert City, Ky.
Raw material: Petroleum-base stocks.
Products: Acrylonitrile, vinyl chloride, acrylic acid, and hydrogen cyanide.
Plant: Henry, Ill.
Products: Rubber chemicals.
Plant: Long Beach, Calif.
Raw material: Vinyl chloride.
Product: Polyvinyl chloride resin.
Plant: Louisville, Ky.
Raw material: Petroleum-base stocks.
Products: Special rubbers including acrylonitrile-butadiene, carboxylic nitrile, butadiene-styrene, and polyacrylic rubber.
Plant: Niagara Falls, N. Y.
Raw material: Vinyl chloride.
Product: Polyvinyl chloride resin.

GOODRICH-GULF CHEMICALS, INC., 1717 E. 9th St., Cleveland 14, Ohio.
Plant: Institute, W. Va.
Product: SBR copolymer (143,500 long tons per year).
• Construction: The company is building a new plant to make polybutadiene at Institute. Raw material will be butadiene. Capacity will be 20,000,000 lb. per year. Completion set for early 1962.
Plant: Port Neches, Tex.
Products: SBR copolymer (129,000 tons per year) and polyethylene (13,000,000 lb. per year).

GOODYEAR TIRE & RUBBER CO., 1144 E. Market St., Akron, Ohio.
Plant: Akron.
Raw material: Petroleum-base stocks.
Products: SBR copolymer (27,500 long tons per year), butadiene acrylonitrile (N-type) elastomers, high-styrene type latices, and vinyl chloride polymers.
Plant: Houston, Tex.
Product: SBR copolymer (245,000 long tons per year).
Plant site: Beaumont, Tex.
• Construction: Polybutadiene production (capacity 20,000 tons per year) due to start fall 1961. Polyisoprene production (capacity 20,000 tons) due on stream spring 1962.

GRACE & CO., W. R., 7 Hanover Square, New York 5, N. Y.
Plant: Owensboro, Ky. This plant is operated by Grace's Dewey and Almy Division, 62 Whittemore Ave., Cambridge, Mass.
Products: Styrene-butadiene latices and polyvinyl acetate.
Plant: Hatco Chemical Division, Fords, N. J.
Product: Phthalic anhydride.
Plant: Nitrogen Products Division, Box 4915, Memphis, Tenn.
Raw material: Natural gas.
Products: Ammonia (160,000 tons per year) and urea (100,000 tons per year).
Plant site: Nitrogen Products Division, Big Spring, Tex.
• Construction: Plans call for a 60,000-ton per year ammonia plant at Big Spring.
Plant: Polymer Chemicals Division, Box 3006, Baton Rouge 5, La.
Raw material: Ethylene.
Product: Polyolefins.

GREAT NORTHERN OIL CO., Box 3596, St. Paul 1, Minn.
Plant: Pine Bend, Minn.
Product: Sulfur from refinery gas (60 tons per day).

GREAT SOUTHERN CHEMICAL CORP., Box 4166, Corpus Christi, Tex.
Plant: Corpus Christi.
Raw material: Naphtha fractions.
Products: Benzene, toluene, xylene, ortho-xylene, and solvent naphtha.

GREAT WESTERN PRODUCERS, INC., Petrochemical Division, 200 N. Wildwood Road, Irving, Tex.
Plant: Irving.
Raw material: Distillate and crude oil.
Products: Aromatic solvents and fuels.

GULF OIL CORP., Gulf Building, Pittsburgh 30, Pa.
Plant: Cleves (Cincinnati), Ohio.

Product: Heptenes from refinery gas.
Plant: Philadelphia, Pa.
Raw material: Heptenes, nonenes, dodecenes, and refinery gases.
Products: Decyl alcohol, isooctyl alcohol, tridecyl alcohol, propylene, and sulfur.
• Construction: New benzene and cumene plants are scheduled for completion early 1962.
Plant: Port Arthur, Tex.
Raw material: Benzene (30,000,000 lb. per year), butane, heptenes, propane, refinery gases, and refinery streams.
Products: Aromatic distillate, benzene, butylenes, cyclohexane, ethylene, isooctyl alcohol, propylene, propylene tetramer, propylene trimer, sulfur, and toluene.
Plant: Waddell, Tex.
Product: Sulfur from natural gas.
Plant site: Cedar Bayou (near Houston).
• Construction: Work is scheduled to begin fall 1961 at an ethylene plant in Harris County, with capacity of more than 400,000,000 lb. per year, more than double the company's present ethylene production. Completion set for mid-1963. Plans also call for facilities for propylene and other chemicals at the 1,000-acre site. Ethane and propane will come from Gulf's West Texas facilities.

HANCOCK CHEMICAL CO. (subsidiary of Signal Oil & Gas Co., 1010 Wilshire Boulevard, Los Angeles 17, Calif.).
Plant: Watson, Calif.
Product: Sulfur from refinery gas (200 tons per day).

HERCULES POWDER CO., Hercules Tower, 910 Market St., Wilmington 99, Del.
Plant: Burlington, N. J.
Raw material: Paraxylene and methanol.
Product: Methylterephthalate (50,000,000 lb. per year).
Plant: Gibbstown, N. J.
Raw material: Propylene and benzene.
Products: Phenol, acetone, cumene, cumene hydroperoxide, acetophenone, and a-methylstyrene.
Plant: Hercules, Calif.
Raw material: Natural gas.
Products: Ammonia (150 tons per day), urea nitrate (20,000 tons per year), nitrogen tetraoxide (10,000 tons per year), formaldehyde (50,000,000 lb. per year), methanol (8,000,000 gal. per year), and urea-formaldehyde compositions (11,000 tons per year).
Plant: Lake Charles, La.
Product: Polypropylene (60,000,000 lb. per year).
• Construction: A second polypropylene plant with capacity of 60,000,000 lb. per year is under construction.
Plant: Louisiana, Mo.
Raw material: Natural gas.
Products: Ammonia (115 tons per day), methanol (70 tons per day), formaldehyde (100,000,000 lb. per year), and pentaerythritol (24,000,000 lb. per year).
Plant: Parlin, N. J.
Raw material: Ethylene and propylene.
Product: Polyolefins (80,000,000 lb. per year).

HEYDEN NEWPORT CHEMICAL CORP., Heyden Chemical Division, 342 Madison Ave., New York 17, N. Y.
Plant: Fords, N. J.
Raw material: Benzene.
Product: Maleic anhydride (24,000,000 lb. per year).
Plant: Garfield, N. J.
Raw material: Maleic anhydride.
Product: Fumaric acid (8,000,000 lb. per year).
Raw material: Toluene.
Product: Benzoic acid (12,000,000 lb. per year).

HOOKER CHEMICAL CORP., EASTERN CHEMICAL DIVISION, Box 344, Niagara Falls, N. Y.
Plant: Niagara Falls.
Raw material: Pentane, petroleum waxes, benzene, toluene, xylene, ethyl alcohol, and isopropyl ether.
Products: Chlorinated waxes, hexachlorocyclopentadiene, phenol, chlorobenzenes, benzene hexachloride, benzoyl chloride, benzyl chloride, monochlorotoluene, benzoic acid, and sodium benzoate.

HOOKER CHEMICAL CORP., DUREZ PLASTICS DIVISION, 5 Walck Road, North Tonawanda, N. Y.
Plant site: South Shore, Ky.
• Construction: Scheduled for completion by end of 1961 are facilities for production of phenol from benzene.

HOUSTON CHEMICAL CORP., American Building, Houston, Tex.
Plant site: Beaumont, Tex.
• Construction: New facilities for production of tetraethyl and tetramethyl lead, ethylene oxide, and derivates will be completed by last quarter 1961.

HUBER CORP., J. M., Box 831, Borger, Tex.
Plant: Baytown, Tex.
Product: Carbon black—furnace process—(210 tons per day).
Plant: Borger, Tex.
Products: 120 tons per day of carbon black (furnace process) and 50 tons per day of carbon black (channel process).

HUMBLE OIL & REFINING CO., 15 W. 51 St., New York 19, N. Y.
Plant: Baton Rouge, La.
Raw material: Natural gas, refinery gas streams, and liquid fractions.
Products: Butyl rubber (60,000 long tons per year), butadiene (55,000 short tons per year), aromatic distillates and solvents (24,000,000 gal. per year of benzene), aromatic tars, ethane, ethylene, propylene, normal butylene, isobutylene, isoprene, nonene, tetrapropylene, ethanol, isopropanol, hexanol, isooctanol, decanol, tridecanol, ethyl ether, isopropyl ether, dicyclopentadiene, petroleum resins, polyisobutylene, hydrogen, oxo alcohols (90,000,000 lb. per year), buton resins for surface coatings (butadiene-styrene copolymer), chlorinated butyl rubber, butyl latex, brominated butyl rubber, and carbon-black feed stocks.
• Construction: Oxo alcohols being expanded from 90,000,000 to 120,000,000 lb. per year, with provision to make 2-ethylhexanol and hexadecyl alcohol. Completion expected early 1962.
Plant: Baytown, Tex.
Raw material: Refinery streams.
Products: Polypropylene (40,000,000 lb. per year), butyl rubber (57,500 long tons per year), butadiene (65,000 short tons per year), benzene (30,000,000 gal. per year), toluene (32,000,000 gal. per year), solvent xylene (5,500 bbl. per year), paraxylene (65,000,000 lb. per year), orthoxylene (10,000,000 gal. per year), high boiling-range aromatic solvents, ethylene, propylene, normal butylenes, isobutylene, pentylene concentrate, heptene, nonene, tetrapropylene, narrow boiling-range aliphatic naphthas (hexane, heptane, and octane), special naphthas, aromatic quench oil, and carbon-black feed stock.
• Construction: Orthoxylene capacity will be increased to 24,000,000 gal. per year in late 1961. Benzene capacity will be increased to 55,000,000 and toluene to 55,000,000 gal. per year early 1962. Paraxylene capacity will be increased to 105,000,000 lb. per year late 1961.
Plant: Bayonne, N. J.
Raw material: Liquid fractions.
Products: Additives for crankcase lubes, automotive transmission fluids, industrial oils, gasoline, and fuel oils; naphthenic acids; and modified buton resins.
Plant: Linden, N. J.
Raw material: Refinery gas streams and liquid fractions.
Products: Ethylene, isobutylene, polyisobutylenes, secondary butanol, methyl ethyl ketone, lube oil additives, nonene, tripropylene, tetrapropylene, acetone, detergent inhibitor and antiwear additives.
• Construction: Ethylene capacity is being expanded from 130,000,000 to 175,000,000 lb. per year with completion early 1962.

JEFFERSON CHEMICAL CO., INC., Box 303, 1121 Walker Ave., Houston 1, Tex.
Plant: Conroe, Tex.
Products: Morpholine, urethane intermediates, and specialty surface-active agents.
Plant: Port Neches, Tex.
Raw material: Refinery gases (ethane, propane streams) and other raw materials.
Products: Ethylene (260,000,000 lb. per year), ethylene oxide (165,000,000 lb. per year), ethylene glycol (126,000,000 lb. per year), ethylene dichloride, propylene oxide, propylene and dipropylene glycol, piperazine, ethylene oxide-tridecyl alcohol condensates, diethylene and triethylene glycols, polyethylene glycols, ethanolamines, ethylene carbonate, propylene carbonate, morpholine, nonyl phenol, and ethylene oxide-nonyl phenol condensates.

JEFFERSON LAKE SULPHUR CO., 1408 Whitney Building, New Orleans 12, La.
Plant: Houston.
Raw material: Refinery treating wastes.
Products: Phenol, cresols, cresylic acid (200,000 gal. per month) and sodium sulfide.
Plant: Manderson, Wyo. (This sulfur-recovery operation was discontinued in 1960.)

KENDALL REFINING CO., Bradford, Pa.
Plant: Bradford.
Raw material: Crude oil.
Products: Heavy hydrocarbons (petroleum polymer and condensation resins).

KOPPERS CO., INC., Plastic Division, Pittsburgh 19, Pa.
Plant: Kobuta, Pa.
Raw material: Ethylbenzene.
Products: Styrene and expandable polystyrene beads.
Plant: Port Arthur, Tex.
Raw material: Ethylene.
Products: Ethylbenzene and high-pressure polyethylene (46,000,000 lb. per year).
Plant: Woodridge Township, N. J.

Raw material: Ethylene.
Products: Low-pressure polyethylene. (Normal capacity is 30,000,000 lb. per year, but part of plant is now being used for production of polypropylene.)

LEONARD REFINERIES, INC., East Superior St., Alma, Mich.
Plant: Alma.
Product: Sulfur from refinery (12 tons per day).
Plant: Roosevelt Division, Mount Pleasant, Mich.
Raw material: Naphtha fraction.
Products: Benzene (330 bbl. per day), toluene (250 bbl. per day), and xylene 200 bbl. per day).

LUBRIZOL CORP., Box 3057, Cleveland 17, Ohio.
Plant: Cleveland.
Raw material: Petroleum fractions.
Products: Lube-oil additives.
Plant: Pasadena, Tex.
Raw material: Petroleum fractions.
Products: Lube-oil additives.
Plant: Painesville, Ohio.
Raw material: Petroleum fractions.
Products: Lube-oil additives.

MARBON CHEMICAL, Division of Borg-Warner Corp., Box 68, Washington, W. Va.
Plant: Gary, Ind.
Raw material: Acrylonitrile, butadiene, and styrene.
Products: High-styrene resins and high-impact thermoplastic molding material.
Plant: Parkersburg, W. Va.
Raw material: Styrene, acrylonitrile, and butadiene.
Products: High-impact thermoplastic resins.

MISSISSIPPI CHEMICAL CORP., Highway 49 E, Yazoo City, Miss.
Plant: Yazoo City.
Raw material: Natural gas.
Products: Ammonia (325 tons per day), ammonium nitrate (500 tons per day), nitric acid (480 tons per day), and urea (100 tons per day).

MOBIL CHEMICAL CO., 150 E. 42 St., New York 17, N. Y.
Plant: Augusta, Kans.
Raw material: Petroleum fractions.
Products: Select aromatic oils.
Plant: Beaumont, Tex.
Raw material: Petroleum fraction.
Products: Ethylene (380,000,000 lb. per year), propylene (100,000,000 lb. per year), butadiene (20,000,000 lb. per year), sulfur, cresylic acid, sodium cresylate, and selected aromatic fraction.
• Construction: To complete benzene facilities early 1962. Capacity will be more than 30,000,000 gal. per year.
Plant: Brooklyn, N. Y.
Raw material: Petroleum fractions.
Products: Sodium cresylate solutions.
Plant: Buffalo, N. Y.
Raw material: Petroleum fractions.
Products: Sodium sulfide and sodium cresylate solutions.
Plant: Casper, Wyo.
Raw material: Petroleum fractions.
Products: Select aromatic oils.
Plant: East Chicago, Ind.
Raw material: Refinery streams.
Products: Sodium cresylate solutions and hydrogen.
Plant: East St. Louis, Ill.
Raw material: Refinery streams.
Products: Sodium cresylate solutions.
Plant: Ferndale, Wash.
Raw material: Refinery streams.
Products: Sodium sulfide and sodium cresylate solutions.
Plant: Paulsboro, N. J.
Raw material: Petroleum fractions.
Products: Sodium cresylate solutions, sodium sulfide, propylene, sulfur, and select aromatic fraction.
Plant: Torrance, Calif.
Raw material: Refinery streams.
Products: Sodium cresylate solutions, ammonium sulfate, and crude naphthenic acids.

MONOCHEM, INC. (jointly owned by Borden Co., 350 Madison Ave., New York 17, and U. S. Rubber Co., Rockefeller Center, 1230 Ave. of the Americas, New York 17, N. Y.).
Plant site: Geismar, La.
• Construction: A $20-million plant to make acetylene and vinyl chloride monomer will be completed here late 1962. Chemical Construction Corp. and United Engineers & Constructors, Inc., are contractors. The methanol synthesis unit of the Monochem complex will be engineered by Vulcan-Cincinnati, Inc. Capacity will be 75,000 gal. daily of methanol, with completion during first half 1962. (Borden and U. S. Rubber each will erect its own plants to use output at the Monochem complex.)

MONSANTO CHEMICAL CO., 800 N. Lindbergh Boulevard, St. Louis 66, Mo.
Plant: Avon, Calif., operated by Monsanto's Organic Chemicals Division.
Raw material: Benzene.
Product: Phenol (by sulfonation).
Raw material: Hydrogen sulfide and spent alkylation acid from Tidewater refinery.
Product: Sulfuric acid (340 tons per day).
Plant site: Chocolate Bayou (near Alvin), Tex.
• Construction: Scheduled on stream late 1962 is a large petrochemical complex, including the world's largest ethylene plant with capacity of 500,000,000 lb. per year. The plant will also have capacity of 42,000,000 gal. per year of benzene, 50,000,000 lb. per year of naphthalene, and 50,000,000 lb. per year of phenol, as well as propylene, cumene, acetone, and ethyl benzene. Facilities will include a new flexible oxo-alcohol unit for production of normal butanol, isobutanol, isooctanol, isodecanol, 2-ethyl hexanol, and other such alcohols.
Plant: El Dorado, Ark., operated by Monsanto's Inorganic Chemicals Division.
Raw material: Natural gas.
Products: Ammonia (585 tons per day), ammonium nitrate, ammonium sulfate, nitrogen solutions, aqua ammonia, and urea (100 tons per day).
Plant: El Dorado, Ark., operated by Monsanto's Lion Oil Co. Division.
Raw material: Refinery streams.
Product: Propylene tetramer (340 bbl. per day).
Raw material: Natural gas.
Product: Sulfur (25 tons per day).
Plant site: Gloucester County, N. J. (near Camden).
• Construction: Completion of a new plant to produce phthalic anhydride and phthalate ester plasticizers from naphthalene is set for completion early 1962. It will increase the company's capacity of the former by more than 30%, and of the latter by more than 50%.
Plant: Luling, La., operated by Monsanto's Inorganic Chemicals Division.
Raw material: Natural gas.
Products: Ammonia (400 tons per day), ammonium nitrate, solid (dry ice) and liquid CO_2 (42 tons per day), and nitrogen solutions.
Plant: Luling, La., operated by Monsanto's Organic Chemicals Division.
Raw material: Petroleum-derived fractions.
Product: Adipic acid.
Plant: Texas City, operated by Monsanto's Lion Oil Co. Division.
Raw material: Natural gas, propane, and butane.
Products: Ethylene and propylene.
Plant: Texas City, operated by Monsanto's Plastics Division.
Raw material: Natural gas, propane, and benzene.
Products: Ethylbenzene, styrene monomer (360,000,000 lb. per year), ethylene dichloride, vinyl chloride, acrylonitrile (100,000,000 lb. per year), hydrogen cyanide, toluene-2°, tertiary-butylamine. (Acetylene and ethylene manufactured here are used internally.)
Raw material: Ethylene.
Product: Polyethylene (100,000,000 lb. per year).
Raw material: Byproduct hydrogen and carbon monoxide from acetylene synthesis.
Product: Methanol.

MONTANA SULPHUR & CHEMICAL CO., Box 1084, Billings, Mont.
Plant: Billings.
Product: Sulfur from refinery gas (40 tons per day).

MONTROSE CHEMICAL CO., 104-12 Lister Ave., Newark 5, N. J.
Plant: Newark.
Raw material: Petroleum cresylic acid and isophthalic acid.
Products: Tricresyl phosphate, diphenyl monocresyl phosphate and dimethyl isophthalate (4,000,000 lb. per year of the latter).

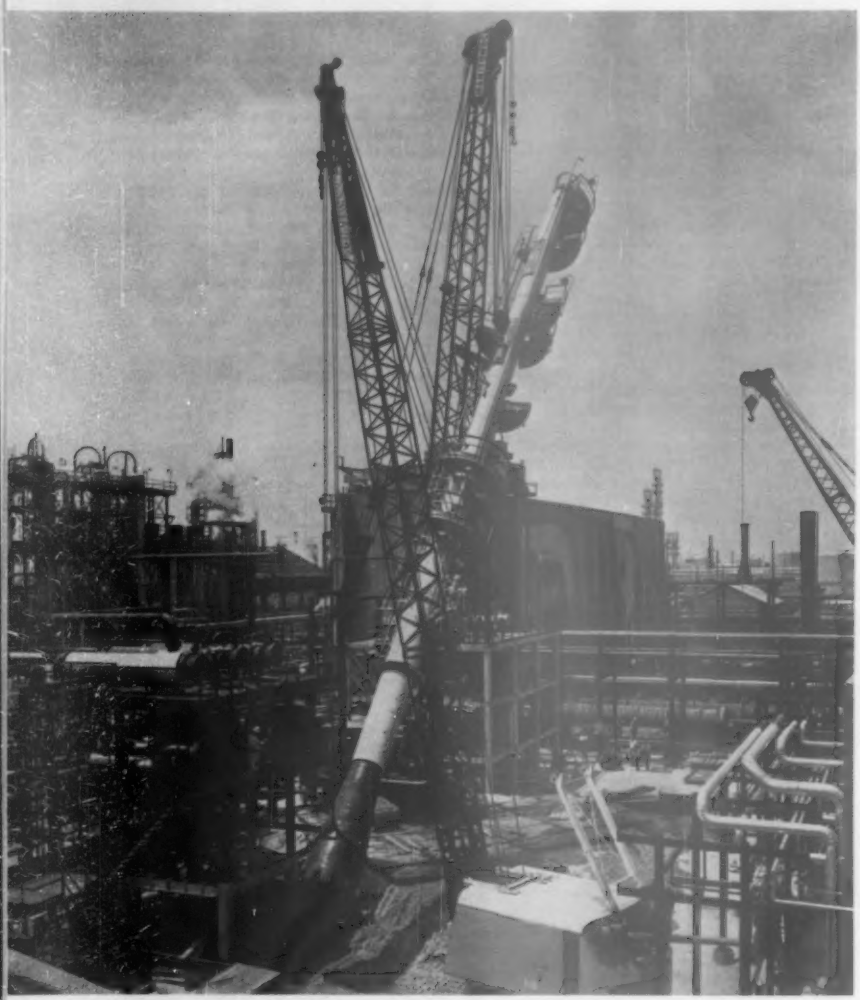
NALCO CHEMICAL CO., 6216 West 66 Place, Chicago 38, Ill.
Plant site: Freeport, Tex.
• Construction: Plans call for alkyl lead production here. The new facility would convert an estimated 26,000,000 lb. per year of lead to alkyls. This amount would yield 40,000,000 lb. of tetraethyl lead or 34,000,000 lb. of tetramethyl lead.

NATIONAL DISTILLERS & CHEMICAL CORP. (See listing for U. S. Industrial Chemicals Co., a division of National Distillers.)

NATIONAL PETRO CHEMICAL CORP. (See listing for U. S. Industrial Chemicals Co., for polyethylene project at Houston.)

NATURAL GAS ODORIZING, INC., Box 15252, Houston, Tex.
Plant: Houston.
Raw material: Crude mercaptans (ethyl and higher).
Products: Odorants for natural gas and LPG.

NAUGATUCK CHEMICAL, division of



OXO-ALCOHOL capacity at Humble Oil & Refining Co.'s Baton Rouge, La., plant is being increased from present 90,000,000 lb. to 120,000,000 lb. per year. Here two crawler cranes raise the first of seven towers for the Aldox unit. New facilities will be completed by end of 1961.

U. S. Rubber Co., Elm St., Naugatuck, Conn.
Plant: Baton Rouge, La.
Raw material: Styrene, butadiene, and acrylonitrile.
Products: N-type rubber, styrene copolymers and latices, as ABS polymers.
• Construction: Pilot plant for synthetic stereo-regular rubber was to be completed third quarter 1961.
Plant: Naugatuck.
Raw material: Styrene and butadiene.
Product: SBR copolymer (30,000 long tons per year).

NECHES BUTANE PRODUCTS CO. (Goodrich-Gulf Chemicals Co. and Texas-U. S. Chemical Co.), Box 667, Port Neches, Tex.
Plant: Port Neches, Tex.
Product: Butadiene (295,000 short tons per year).

NEVILLE CHEMICAL CO., Neville Island, Pittssburgh 25, Pa.
Plant: Anaheim, Calif.
Raw material: Unsaturated petroleum fractions.
Products: Aromatic petroleum solvents, heat-reactive resins, and thermoplastic resins.
Plant: Neville Island, Pa.
Raw material: Unsaturated petroleum fractions.
Products: Aromatic petroleum solvents, heat-reactive resins, and thermoplastic resins.

NOPCO CHEMICAL CO., 1141 S. 14. St., Richmond, Calif.
Plant: Richmond.
Raw material: Petroleum fractions.
Products: Naphthenic acid and petroleum sulfonates (emulsifying agents).
Plant site: Near Linden, N. J.
• Construction: Scheduled on stream early 1962 is an isocyanate plant, with capacity of 10,000,000 lb. per year. Bechtel Corp. has contract.

NORTHERN CHEMICALS INDUSTRIES, Totman Building, 210 East Redwood St., Baltimore 2, Md.
Plant: Searsport, Me.
Raw material: Bunker C fuel oil.
Products: Ammonia (125 tons per day) and nitrogen solutions.

NORTHWEST PETROCHEMICAL CORP., Anacortes, Wash.
Plant: Anacortes.
Raw material: Spent caustic from oil refineries.
Products: Refined cresols, phenol, and xylenol.

NORTHWEST PRODUCTION CORP. (formerly Barnhart Hydrocarbon Corp.), Drawer 986, Big Lake, Tex.
Plant: Barnhart field, Reagan County, Texas.
Product: Output at gas-processing plant includes 3 tons per day of sulfur.

NOVAMONT CORP., subsidiary of Montecatini, Largo Donegani 1-2, Milan, Italy.
Plant site: Neal, W. Va.
• Construction: Scheduled for completion late 1961 are facilities with capacity of 25,000,000 lb. per year of isotactic polypropylene and other polyolefins.

ODESSA BUTADIENE CO. (owned by El Paso Natural Gas Products Co., Box 1161, El Paso, Tex.)
Plant: Odessa, Tex.
Product: Butadiene (50,000 short tons per year).

ODESSA NATURAL GASOLINE CO., Box 3908, Odessa, Tex.
Plant: Odessa.
Product: Sulfur from natural gas (12 tons per day).

ODESSA STYRENE CO. (owned by El Paso Natural Gas Products Co., Box 1161, El Paso, Tex., and United Carbon Co.).
Plant: Odessa, Tex.
Raw material: Crude oil and natural gasoline.
Product: New facilities for 900 bbl. per day of benzene completed August 1961.
Ray material: Propane and benzene.
Product: Styrene (85,000,000 lb. per year).

OLIN-MATHIESON CHEMICAL CORP., 460 Park Ave., New York 22, N. Y.
Plant: Brandenburg, Ky.
Raw material: Ethane and propane.
Products: Ethylene oxide, propylene oxide; ethylene, diethylene, triethylene, propylene and dipropylene glycols; polyethylene glycols; polypropylene glycols; propoxylated glycerin; ethylene dichloride; propylene dichloride; ethylene glycol ethers; ethylene glycol ether esters; ethanolamines; dichloroethyl ether; aromatic distillates and solvents; ethylene chlorohydrin; nomionic surface active agents (polyoxyethylene ether alcohols); polyamides; synthetic glycerin; and pour-point depressants and v.i. improvers for lube oil.
Plant: Lake Charles, La.
Raw material: Natural gas.
Products: Ammonia (250 tons per day) and hydrazine.
Plant: McKamie, Ark.
Product: Sulfur from natural gas (100 tons per day).

OXO CHEMICALS CO. (owned by Amoco Chemicals Corp. and Pittsburgh Chemical Co., a subsidiary of Pittsburgh Coke & Chemical Co.), Suite 300, Prudential Plaza, Chicago 1, Ill.
Plant site: Haverhill, Ohio.
• Construction: Completion of a multimillion-pound per year isooctyl and decyl alcohol plant is scheduled early 1962.

PAN AMERICAN PETROLEUM CORP., Box 591, Tulsa, Okla.
Plant: Cottonwood Creek field, near Worland, Wyo.
Product: Sulfur from natural gas (22 tons per day).
Plant: Elk Basin field, Wyoming.
Product: Sulfur from natural gas (110 tons per day).
Plant: Empire Abo field, Eddy County, New Mexico.
Product: Sulfur from natural gas (22 tons per day).
Plant: Midland Farms field, Andrews County, Texas.
Product: Sulfur from natural gas (12 tons per day).
Plant: North Cowden field near Odessa, Tex.
Product: Sulfur from natural gas (18 tons per day).
Plant: Slaughter field near Sundown, Tex.
Product: Sulfur from natural gas (48 tons per day).

PANTASOTE CO., 26 Jefferson St., Passaic, N. J.
Plant: Passaic, N. J.
Product: Polyvinyl chloride (50,000,000 lb. per year).

PARKER, J. L., 302 Wright Building, Tulsa 3, Okla.
Plant: Andrews, Tex.
Product: Sulfur from natural gas (15 tons per day).
Plant: Madill, Okla.
Product: Sulfur from natural gas (15 tons per day).
Plant: Penwell, Tex.
Product: Sulfur from natural gas (30 tons per day).

PENNSALT CHEMICALS CORP., Three Penn Center, Philadelphia 2, Pa.
Plant: Houston, Tex.
Raw materials: Natural gas, butane, petroleum naphthas, methyl alcohol, ethyl alcohol, sulfur, and various olefins.
Products: Methyl mercaptan, ethyl mercaptan, thiophene, butyl mercaptan, tetrahydrothiophene, octyl mercaptan, tertiary butyl mercaptan, tertiary nonyl mercaptan, and tertiary dodecyl mercaptan.
Plant: Wyandotte, Mich.
Raw material: Pentane, pentane fractions, triisobutylene, alcohols, and ammonia.
Products: Amyl alcohol, amyl chloride, amyl acetate, amyl phenols, amyl naphthalenes, n-alkyl mercaptans, tertiary dodecyl mercaptan, polyethylene glycol tert-dodecyl thioether, 2-pentene, mixed pentenes, thiophene, tetene, tetra hydrothiophene, carbon disulfuride, and alkylamines.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP., Clairton, Pa.
Plant: Chester, Pa.
Raw material: Petroleum base stocks.
Products: Petroleum polymer and condensation resins.
Plant: West Elizabeth, Pa.
Products: Hydrocarbon resins and aromatics.

PENNSYLVANIA REFINING CO., Butler, Pa.
Plant: Karns City, Pa.
Raw material: Crude oil, finished and semifinished lube oil, distillates, and waxes.
Products: Petroleum sulfonates.

PETROCHEMICALS CO., DIVISION OF UNIVERSAL DETERGENTS, INC., 1825 E. Spring St., Long Beach 6, Calif.
Plant: Long Beach.
Raw material: Petroleum fractions.
Products: Alkyl naphthalene sulfonates and aromatic solvents.

PETROLEUM CHEMICALS, INC. (Cities Service Co. and Continental Oil Co.), Box 1522, Lake Charles, La.
Plant: Lake Charles.
Raw material: Petroleum feed stocks.
Products: Ethylene (300,000,000 lb.), butadiene (86,000 short tons per year), ammonia (130,000 tons per year), and oxygen (90 tons per day).

PETRO-TEX CHEMICAL CORP. (owned 50% by Tenneco Corp.), Box 2584, Houston, Tex.
Plant: Houston.
Raw material: Petroleum-base stock.
Products: Butene-1, butene-2, diisobutylene, isobutylene (2,000,000 gal. per year), butadiene (200,000 short tons per year), and aviaion alkylation. Facilities also include a full-scale pilot plant for polybutene-1 and a semi-plant for tetrahydrophthalic anhydride.
• Construction: Scheduled for completion September 1961 are facilities for maleic anhydride (30,000,000 lb. per year), using C_4 hydrocarbons as raw material.

PHILLIPS CHEMICAL CO., Bartlesville, Okla.
Plant: Big Spring, Tex. (operated by Cosden Petroleum Corp.)
Raw material: Mixed xylene.
Product: Paraxylene (6,000,000 lb. per year).
Plant: Borger, Tex.
Raw material: Gas oil.
Product: Carbon blacks, using furnace process (290,000,000 lb. per year).
Raw material: Butane.
Products: Butadiene (112,000 short tons per year), butene-1, and butene-2.
Raw material: Butadiene and styrene.
Products: SBR copolymer (93,500 long tons per year and Cis-4 polybutadiene rubber (25,000 long tons per year).
Plant: Etter, Tex. (Part of the facilities are government leased, with a portion owned by Phillips Chemical.)
Raw material: Natural gas.
Products: Anhydrous ammonia (208,100 short tons per year), nitric acid (130,000 short tons per year), ammonium nitrate (153,000 short tons per year), and nitrogen solutions (55,000 short tons per year).

Plants: Goldsmith and Crane, Tex. (operated by Phillips Petroleum Co.).
Product: Sulfur from H_2S (87,600 long tons per year).
Plant: Near Orange, Tex.
Raw material: Gas oil.
Product: Carbon black (60,000,000 lb. per year).
Plant: Pasadena, Tex.
Raw material: Methyl ethyl pyridine.
Product: Methyl vinyl pyridine (5,400,000 lb. per year).
Raw material: Natural gas.
Product: Anhydrous ammonia (219,000 short tons per year).
Raw material: Ammonia and sulfuric acid.
Product: Ammonium sulfate (401,500 short tons per year).
Raw material: Ethylene.
Product: Polyethylene (100,000,000 lb. per year).
Plant: Phillips, Tex.
Raw material: Petroleum fractions.
Products: Tert-butyl mercaptans, tert-dodecyl mercaptan, other sulfur chemicals, n-butyl mercaptan, other chemical specialties, n-propyl mercaptan, high-purity hydrocarbons, and polybutadiene rubber.
Plant: Sweeny, Tex.
Raw material: Butane and/or propane.
Products: Ethylene (323,000,000 lb. per year), propylene, and butadiene concentrate.
• Construction: Ethylene capacity is being expanded to 500,000,000 lb. per year, with completion third quarter 1961.

PHILLIPS PACIFIC CHEMICAL CO. (owned by El Paso Natural Gas Co. and Phillips Petroleum Co. Operator of the plant is Phillips Chemical Co., Bartlesville, Okla.).
Plant: Kennewick, Wash.
Raw material: Natural gas.
Product: Anhydrous ammonia (80,300 short tons per year).

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
Plant: Kansas City, Kans.
Raw material: Petroleum fractions.
Products: Rubber extender and process oils.
Plant: Phillips, Tex.
Raw material: Petroleum fractions.
Products: Di-isopropyl, cyclohexane, n-pentene, hydrogen sulfide, ethyl mercaptan, reference fuels for knock engines, and solvents.
Plant: Sweeny, Tex.
Raw material: Petroleum fractions.
Products: Cyclohexane and benzene concentrate.

PITTSBURGH PLATE GLASS CO., Chemical Division (formerly operated by Pittsburgh's subsidiary, Columbia-Southern Chemical Corp.), Gateway Center, Pittsburgh 22, Pa.
Plant: Barberton, Ohio.
Raw material: Propane.
Products: Perchloroethylene and carbon tetrachloride.
Plant: Natrium, W. Va.
Raw material: Benzene.
Products: Monochlorobenzene, ortho-dichlorobenzene, paradichlorobenzene, and benzene haxachloride.
Plant: Lake Charles, La.
Raw material: Ethylene.
Product: Ethylene dichloride.
Plant: South Charleston, W. Va.
Raw material: Natural gas.
Product: Carbon bisulfide.

PLYMOUTH OIL CO., REPUBLIC DIVISION (formerly Republic Oil Refining Co.), Benedum Trees Building, Pittsburgh 22, Pa.

Plant: Texas City, Tex.
Raw material: Refinery-gas streams.
Products: Butane and butylenes, ethylene, propylene tetramer, propylene trimer, benzene (5,000,000 gal. per year), toluene (14,000,000 gal.), and xylene (14,000,000 gal. per year).

PRODUCTOL CO., 417 S. Hill St., Los Angeles 13, Calif.
Plant: Santa Fe Springs, Calif.
Raw material: Refinery byproduct fractions.
Products: Phenols, cresols, cresylic acids, and xylenols.

PURE OIL CO., 200 E. Golf Road, Palatine, Ill.
Plant: Lemont, Ill.
Raw material: Petroleum fractions.
Products: Solvents.
Raw material: Refinery gas.
Product: Sulfur (20 tons per day).
• Construction: Petroleum fractions will be used to make 25,000 gal. per day of hexane and heptane and 70,000 gal. per day of benzene, toluene, and xylene. Project will be completed last quarter 1961.
Plant: Smiths Bluff plant at Nederland, Tex.
Raw material: Petroleum fractions and refinery-gas streams.
Products: Solvents, 1-butene, and mixtures.
• Construction: In a joint operation with Atlantic Refining Co., petroleum fractions will be used to manufacture benzene, toluene, and xylene, with completion of project last quarter 1961. Capacity will be 137,000 gal. per day.
Plant: Toledo, Ohio.
Raw material: Petroleum fractions.
Products: Solvents.

REICHHOLD CHEMICALS, INC., RCI Building, White Plains, N. Y.
Plant: Azusa, Calif.
Raw material: Formaldehyde, USP phenol, petroleum solvents, and styrene.
Products: Phenol-formaldehyde resins, alkyd resin solutions, and polyester resins.
Plant: Ballardvale, Mass.
Raw material: Formaldehyde, USP phenol, methanol (from natural gas), bis-phenol, acetone, and epichlorhydrin.
Products: Phenol-formaldehyde resins, urea-formaldehyde resins, formaldehyde, and epoxy resins (10,000,000 lb. per year of liquid and solid epoxies).
Plant: Carteret, N. J.
Product: Semi-commercial production of melamine.
• Construction: Plans call for expansion.
Plant: Charlotte, N. C.
Raw material: Methanol (from natural gas), formaldehyde, and vinyl acetate monomer.
Products: Formaldehyde, urea-formaldehyde resins, and polyvinyl acetate emulsions.
Plant: Detroit, Mich.
Raw material: Formaldehyde, USP phenol, styrene, petroleum solvents, glycerin (synthetic), and normal butyl alcohol.
Products: Phenol-formaldehyde resins, urea-formaldehyde resins, polyester resins, styrenated alkyd resins, alkyd resin solutions, alkyd resins, and butylated urea-formaldehyde resins.
Plant: Elizabeth, N. J.
Raw material: Benzene and petroleum solvents and naphthas, USP phenol, styrene, vinyl acetate monomer, and glycerin (synthetic).
Products: Maleic anhydride, phthalic anhydride, phenol-formaldehyde resins, urea-formaldehyde resins, polyester resins, styrenated alkyd resins, polyvinyl acetate emulsions, alkyd resins, and ester gum.
Plant: Hampton, S. C.
Raw material: Methanol (from natural gas).
Product: Formaldehyde.
Plant: Houston, Tex.
Raw material: Styrene, maleic anhydride, and petroleum solvents.
Products: Polyester resins and alkyd resins.
Plant site: Houston area.
• Construction: Facilities to produce vinyl acetate.
Plant: Jacksonville, Fla.
Raw material: Formaldehyde and vinyl acetate monomer.
Products: Urea-formaldehyde resins and polyvinyl acetate emulsions.
• Construction: Facilities for polyester and alkyd resins.
Plant: Kansas City, Kans.
Raw material: Formaldehyde, USP phenol, vinyl acetate monomer, and methanol (from natural gas).
Products: Phenol-formaldehyde resins, polyvinyl acetate emulsions, and formaldehyde.
Plant: Seattle.
Raw material: USP phenol, formaldehyde, and methanol (from natural gas).
Products: Pentachlorophenol, phenol-formaldehyde resins, and formaldehyde.
Plant: South San Francisco, Calif.
Raw material: Formaldehyde, USP phenol, petroleum solvents, and vinyl acetate monomer.
Products: Phenol-formaldehyde resins, urea-formaldehyde resins, alkyd resin solutions, and polyvinyl acetate emulsions.
Plant: Tacoma, Wash.
Raw material: Methanol (from natural gas), formaldehyde, maleic anhydride, and USP phenol.
Products: Formaldehyde, phenol-formaldehyde resins, pentachlorophenol, and polyester resins.
Plant: Tuscaloosa, Ala.
Raw material: Methanol (from natural gas), benzene, formaldehyde, acetaldehyde, USP phenol, and petroleum solvents.
Products: Formaldehyde, USP phenol, pentaerythritol, phenol-formaldehyde resins, and urea-formaldehyde resins.

REPUBLIC OIL REFINING CO. (See listing for Plymouth Oil Co.)

REXALL CHEMICAL CO., 8480 Beverly Boulevard, Los Angeles, Calif.
Plant: Holyoke, Mass.
Product: Polystyrene.
Plant: Santa Ana, Calif.
Product: Polystyrene.
Plant site: Near Chicago.
• Construction: Polystyrene plant with capacity of 25,000,000 lb. per year reportedly was to be built near Chicago.
Plant site: Odessa, Tex. (For details see listing for El Paso Natural Gas Co.)

RICHARDSON CARBON CO., SID, 1105 Fort Worth National Bank Building, Fort Worth 2, Tex.
Plant: Big Spring, Tex.
Raw material: From Cosden Petroleum Corp. refinery.
Product: Carbon black, using furnace process (50,000,000 lb. per year).

RICHARDSON GASOLINE CO., SID, (Division of Sid Richardson Carbon Co.) 1105 Fort Worth National Bank Building, Fort Worth 2, Tex.
Plant: Keystone field, Winkler County, Texas.
Product: Sulfur from natural gas (production of 5 tons per day).

RICHFIELD OIL CORP., 555 S. Flower St., Los Angeles 17, Calif.
Plant: Benzene-toluene unit at Watson, Calif.
Raw material: Petroleum fractions, refinery cracked gases, and propylene polymer.
Products: Naphthenic acids, ethylene-ethane stream, benzene (18,000,000 gal. per year), toluene (18,000,000 gal. per year), mixed xylenes, high-purity propylene, and propylene tetramer and trimer.

ROHM & HAAS CO., Washington Square, Philadelphia 5, Pa.
Plant: Deer Park, Pasadena, Tex.
Raw material: Natural gas.
Products: Methanol, ammonia, acetylene, carbon monoxide, hydrogen, hydrogen cyanide, acetone, acetone cyanohydrin, methyl methacrylate, and methyl and ethyl acrylate.
Plant site: Louisville, Ky.
• Construction: After renovation of the former government-operated butadiene plant in Louisville, Rohm & Haas reportedly plans to produce methyl methacrylate monomer, acrylic molding powder, and ammonium sulfate. Plant will not be in operation until after 1961. Scheduled for complete late summer 1962 are facilities for making adipic acid from cyclohexane. Scientific Design Co., Inc., has contract for the latter.

SCHENECTADY VARNISH CO., INC., Congress St. and Ninth Ave., Schenectady, N. Y.
Plant site: Rotterdam Junction, N. Y.
• Construction: Scheduled for completion early 1962 are facilities for phenol production.

SHAMROCK OIL & GAS CORP., Box 631, Amarillo, Tex.
Plant site: Sunray, Tex.
Raw material: Sour natural gas and refinery gas.
Product: 30 long tons per day of sulfur.
Raw material: Sulfur and H_2S.
Product: Sulfuric acid (110 tons per day).
• Construction: Scheduled for completion July 1962 are facilities to produce anhydrous ammonia from natural gas. Capacity 160 tons per stream day.

SHELL CHEMICAL CO., 50 W. 50 St., New York 20, N. Y.
Plant: Denver, Colo.
Raw material: Petroleum hydrocarbons.
Products: Aldrin, dieldrin, endrin, methyl parathion, insecticide, and soil fumigant.
Plant: Dominguez, Calif.
Raw material: Petroleum hydrocarbons.
Products: Isopropyl alcohol, acetone, methyl ethyl ketone, methyl isobutyl ke-

tone, diacetone alcohol, sec.-butyl alcohol, mesityl oxide, and methyl isobutyl carbinol.
Plant: Houston.
Raw material: Petroleum hydrocarbons.
Products: Acetone, diacetone alcohol, ethyl alcohol, hexylene glycol, isopropyl alcohol, isopropyl ether, mesityl oxide, methyl ethyl ketone, methyl isobutyl carbinol, methyl isobutyl ketone, sec.-butyl alcohol, allyl alcohol, allyl chloride, epichlorohydrin, ethyl chloride, epoxy resins, D-D soil fumigant, phenol, bisphenol A, and sulfur.
Plant: Martinez, Calif.
Raw material: Petroleum hydrocarbons.
Products: Ethyl amyl ketone, terbutyl alcohol, Ional antioxidant, p-tert-butyl benzoic acid, ditertiary butyl peroxide, octyl formol, pent-oxone and pent-oxol solvent, tertiarybutyl hydroperoxide, Bionox M, acrolein derivatives, and mono, di and triallylamines.
Plant: Norco, La.
Raw material: Petroleum hydrocarbons.
Products: Crude chlorohydrins, allyl chloride, D-D soil fumigant, hydrogen peroxide, sec.-butyl alcohol, acrolein, and glycerin.
Plant: Shell Point (Pittsburgh), Calif.
Raw material: Natural gas.
Products: Ammonia (110,000 tons per year,) ammonium sulfate (175,000 tons per year), diammonium phosphate, and catalysts.
Plant: Torrance, Calif.
Products: SBR copolymer (104,000 long tons per year), butadiene (70,000 short tons per year), styrene (210,000,000 lb. per year), and polyisoprene (40,000 lb. per year).
Plant: Ventura, Calif.
Raw material: Natural gas.
Products: Ammonia (80,000 tons per year) and urea (65,000 tons per year).
Plant: Wallingford, Conn.
Product: High-impact and general-purpose polystyrene is being produced on a commercial scale at leased facilities.
Plant site: Marietta, Ohio.
• Construction: Scheduled for completion late 1961 are polyisoprene facilities, with capacity of 80,000,000 lb. per year.
Plant site: Woodbury, N. J.
• Construction: Scheduled for completion in 1962 are polypropylene facilities, with capacity of 80,000,000 lb. per year.

SHELL OIL CO., 50 W. 50 St., New York 20, N. Y.
Plant: Houston, Tex.
Raw material: Refinery streams.
Products: Benzene and toluene.
Plant: Martinez, Calif.
Raw material: Refinery streams.
Products: Petroleum sulfonates (sodium salt).
Plant: Wilmington, Calif.
Raw material: Refinery streams.
Products: Benzene, toluene, xylene, and cresylic acid.
Plant: Wood River, Ill.
Raw material: Refinery streams.
Products: Benzene, toluene, and xylene.
Plant site: On Delaware Bay 5 miles from Smyrna.
• Construction: A 3,500-acre site has been selected by Shell for the company's first East Coast refinery. Long-range program includes a refinery, a chemical plant or complex, and research facilities.

SIGNAL OIL & GAS CO., 1010 Wilshire Boulevard, Los Angeles 17, Calif.
Plant: Tioga, N. D.
Product: Sulfur from natural gas (65 tons per day).
Plant: Houston, Tex.
Raw material: Refinery stream.
Products: Benzene (1,600 bbl. per day), xylene (1,200 bbl.), hexane (200 bbl.), heptane (200 bbl.), aliphatic solvents (1,400 bbl.), and aromatic solvents (600 bbl. per day).

SINCLAIR-KOPPERS CHEMICAL CO. (Sinclair Oil Corp. and Koppers Co., Inc.). 600 Fifth Ave., New York 20, N. Y.
Plant site: Houston, Tex.
• Construction: Facilities to produce 70,000,000 lb. per year of styrene monomer from petroleum fractions will be completed third quarter 1961.

SINCLAIR PETROCHEMICALS, INC., 600 Fifth Ave., New York 20, N. Y.
Plant: East Chicago, Ind.
Raw material: Petroleum fractions.
Products: Antioxidants, aromatic solvents, aliphatic solvents, gear-oil additives, turbine-oil additives, cutting-oil additives, and cresylic acids.
Plant: Hartford, Ill.
Raw material: Petroleum fractions.
Products: Aromatic solvents.
• Construction: Scheduled for completion third quarter 1961 are facilities to produce heptanes from petroleum fraction.
Plant: Houston, Tex.
Raw material: Petroleum fractions.
Products: Oil-layer-type petroleum sulfonates (barium, calcium, and sodium salts); corrosion inhibitors; isoparaffinic odorless solvents; cresylic acids; and toluene, paraxylene, xylenes (60,000,000 gal. per year); orthoxylene (70,000,000 lb. per year); and aliphatic solvents.
Plant: Marcus Hook, Pa.
Raw material: Petroleum streams.
Products: Cresylic acids.
Raw materials: Petroleum fractions.
Products: Aliphatic solvents and heptanes.
Raw material: Catalytic reformate.
Product: Toluene (400 bbl. per day), paraxylene (12,000,000 lb. per year), xylene solvents (1,000 bbl. per day), and heavy aromatic solvents.
Raw material: Refinery gas.
Product: High-purity propylene.
Raw material: Petroleum fractions.
Product: Durene.
Plant: Sand Springs, Okla.
Raw material: Petroleum fractions.
Products: Demulsifying agents, corrosion inhibitors, acid-layer-type petroleum sulfonite (sodium salt), and oil-layer-type petroleum sulfonate (sodium salt).

SINCLAIR REFINING CO., 600 Fifth Ave., New York 20, N. Y.
Plant: Houston, Tex.
Product: Sulfur from refinery gas (30 tons per day).
Plant: Marcus Hook, Pa.
Product: Sulfur from refinery gas (52 tons per day).

SMITH DOUGLASS CO., INC., 5100 Virginia Beach Boulevard, Norfolk, Va.
Plant: Houston, Tex.
Raw material: Natural gas.
Product: Anhydrous ammonia (42,000 short tons per year).

SOHIO CHEMICAL CO., Box 628, Lima, Ohio.
Plant: Lima.
Raw material: Natural gas and refinery offgas.
Products: Anhydrous ammonia (300 tons per day), aqua ammonia, nitrogen solutions and combinations of ammonia, ammonium nitrate, urea solutions, coated 45% or uncoated 46% urea, feed-grade urea, chemical-grade urea, nitric acid, and carbon dioxide.
Raw material: Propylene and ammonia.
Products: Acrylonitrile and acetonitrile.

SOLAR CHEMICAL CORP., Solar Park, Leominster, Mass.
Plant: Leominster.
Products: Varying grades of polystyrene, including a high-heat material, a general-purpose polystyrene, and two superfast-flow polystyrenes, as well as high-impact and medium-impact polystyrenes.

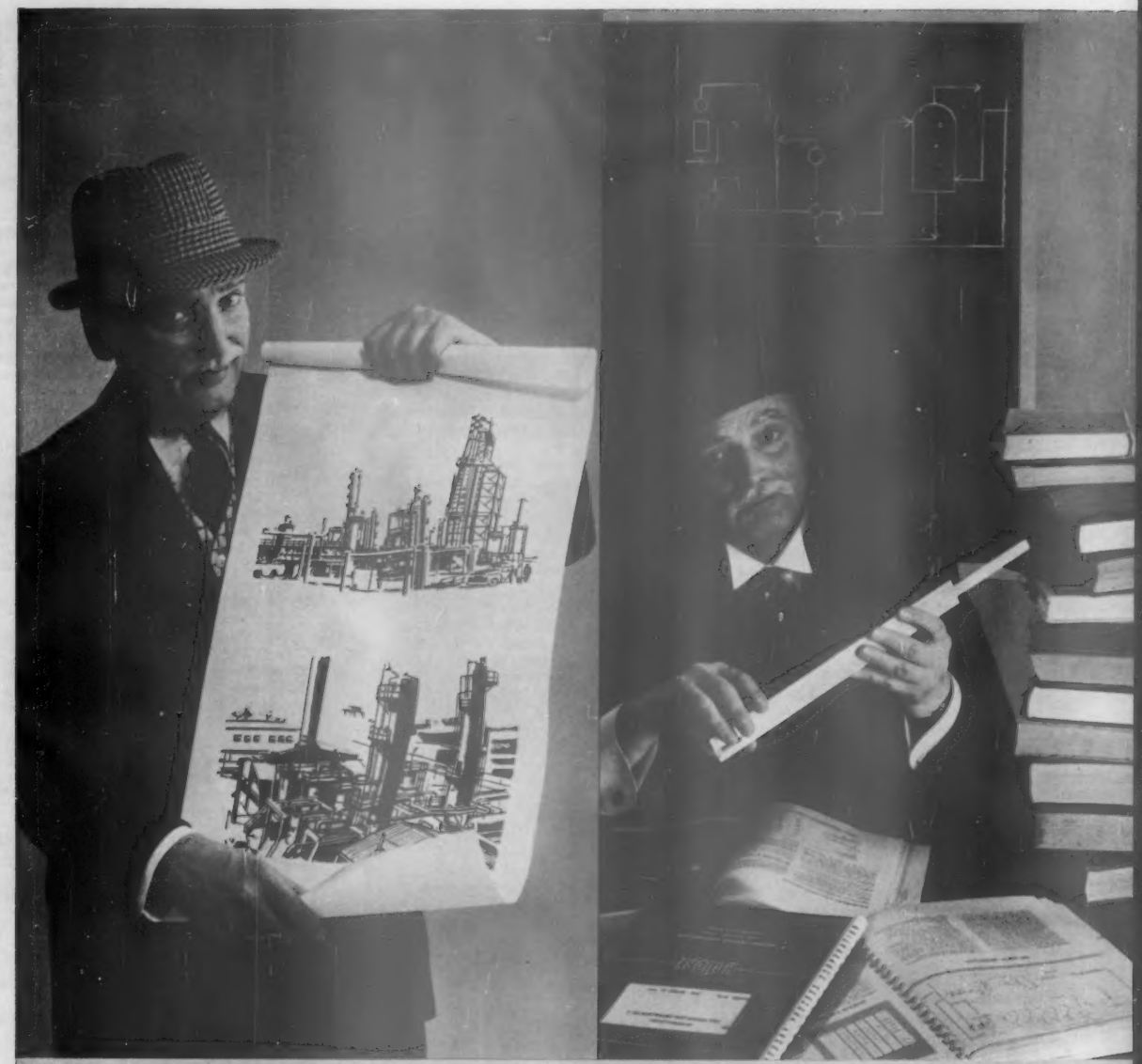
SOLAR NITROGEN CHEMICALS CO. (joint subsidiary of Atlas Powder Co. and Standard Oil Co. of Ohio, Midland Building, Cleveland 15, Ohio).
Plant: Lima, Ohio.
Raw material: Natural gas.
Products: Anhydrous ammonia and urea.
Plant: Joplin, Mo.
Raw material: Natural gas.
Products: Anhydrous and aqua ammonia, nitrogen solutions, coated 45%, uncoated 46% urea, and feed urea. (Capacity of plant 300 tons per day.)

SONNEBORN CHEMICAL & REFINING CORP., 300 Park Ave. S, New York 10, N. Y.
Plant: Petrolia, Pa. (operated by Sonneborn's Daugherty Refinery Division).
Raw material: Petroleum fractions.
Products: Oil-layer type of petroleum sulfonate (sodium and alkaline earth salts), and water-soluble petroleum sulfonate.

SOUTH HAMPTON CO., 2444 Times, Houston, Tex.
Plant: Silsbee, Tex.
Raw material: From adjacent Sinclair gas-processing plant.
Products: Benzene (capacity reportedly 4,000,000 to 6,000,000 gal. per year).

SOUTHERN NITROGEN CO., INC., Box 246, Savannah, Ga.
Plant: Savannah.
Raw material: Natural gas.
Products: Anhydrous ammonia (100,000 tons per year), aqua ammonia, nitrogen solutions, prilled ammonium nitrate, calcium ammonium nitrate, liquid carbon dioxide, and urea (20,000 tons per year).
• Construction: Scheduled for completion October 1, 1961, is a project to increase nitric-acid facilities from 100,000 to 130,000 tons per year.

SPENCER CHEMICAL CO., 610 Dwight Building, Kansas City 5, Mo.
Plant: Calumet City, Ill.
Raw material: Methanol and ammonia.
Products: Formaldehyde and aqua ammonia.
• Construction: Facilities for making polyethylene latexes from ethylene are under construction, at cost of more than $1,000,000.



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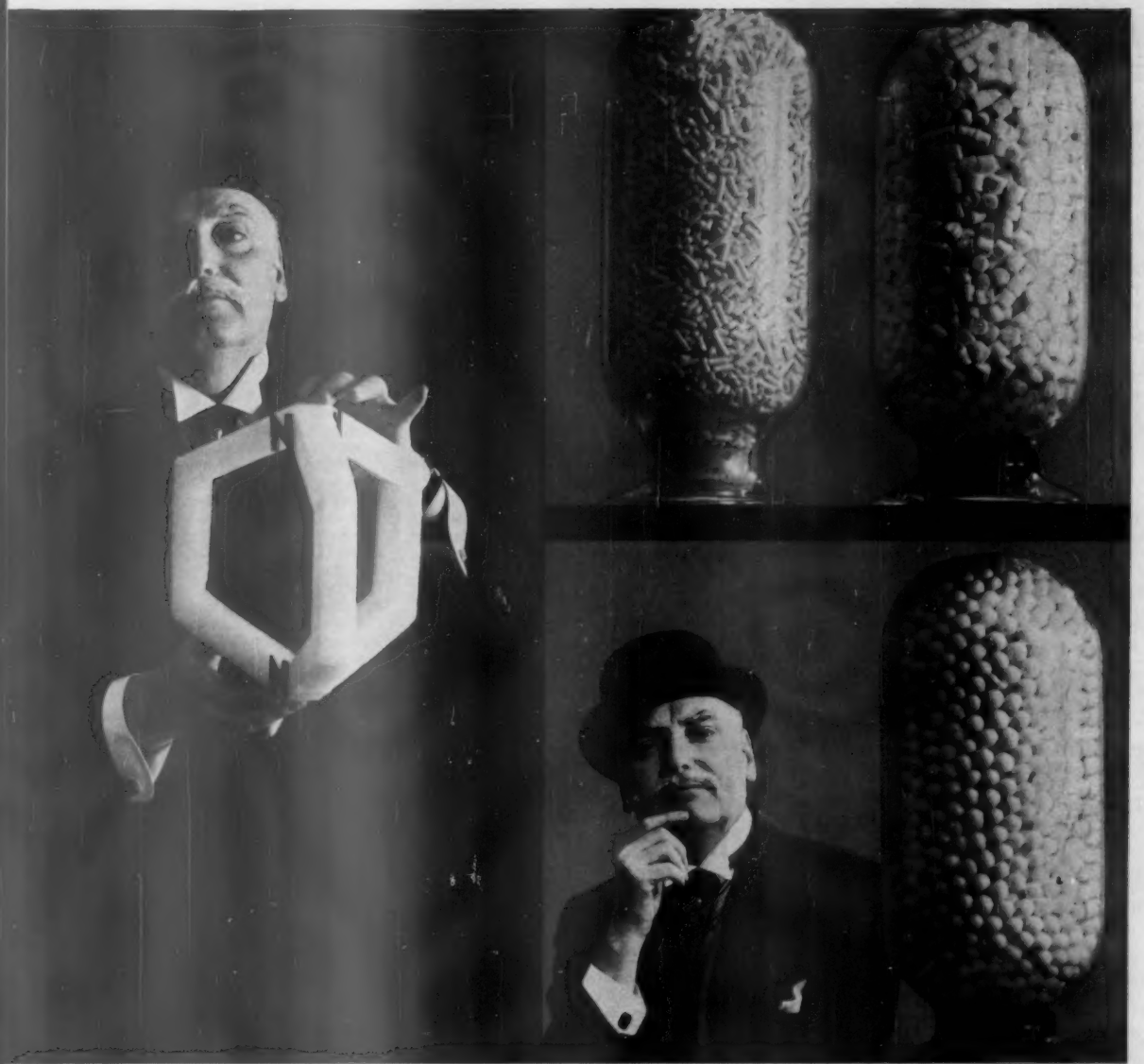

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Plant: Fort Worth, Tex.
Raw material: Natural gas.
Products: Dry ice and liquid CO_2.
Plant: Henderson, Ky.
Raw material: Natural gas.
Products: Ammonia (200 tons per day), nitric acid, ammonia solutions, urea (100 tons per day), and aqua ammonia.
Raw material: Caprolactum.
Products: Nylon-6 molding resins.
Plant: Orange, Tex.
Raw material: Ethylene.
Product: Polyethylene (120,000,000 to 135,000,000 lb. per year).
Plant: Pittsburg, Kans.
Raw material: Natural gas.
Products: Ammonia (500 tons per day), nitric acid, aqua ammonia, ammoniating solutions, ammonium nitrate, dry ice, uranium dioxide, and methanol.
Plant: Vicksburg, Miss.
Raw material: Natural gas.
Products: Ammonia (200 tons per day), nitric acid, ammonia solutions, urea (11,000 tons per year), and argon.

ST. PAUL AMMONIA PRODUCTS, INC., Box 418, South St. Paul, Minn.
Plant: Pine Bend, South St. Paul.
Raw material: Natural gas and refinery gas.
Products: Ammonia (265 tons per day), nitric acid, and ammonium nitrate solutions.

STANDARD OIL CO. (IND.). (See listing for American Oil Co.)

STANDARD OIL CO. OF CALIFORNIA (See listing for California Chemical Co., a wholly owned subsidiary.)

STAUFFER CHEMICAL CO., 380 Madison Ave., New York 17, N. Y.
Plant: Baton Rouge, La.
Raw material: Refining sludge acid and refinery H_2S gas stream.
Products: Sulfuric acid and sulfur.
Plant: Baytown, Tex.
Product: Sulfur from refinery gas (100 tons per day).
Plant: Dominguez, Calif.
Product: Sulfuric acid from refinery sludge acid or H_2S.
Plant: Hammond, Ind.
Product: Refinery spent acid is used to make virgin sulfuric acid.
Plant: Houston, Tex.
Product: Sulfuric acid from refinery sludge.
Plant: Le Moyne,, Ala.
Raw material: Natural gas and sulfur.
Product: Carbon disulfide.
Plant: Louisville, Ky.
Raw material: Propane, propylene, and natural gas.
Products: Carbon tetrachloride, perchlorethylene, chloroform, methylene chloride, and hydrogen chloride.
Plant: Delaware City, Del.
Raw material: Natural gas and sulfur.
Products: Carbon disulfide and sodium hydrosulfide.

SUN OIL CO., 1608 Walnut St., Philadelphia 3, Pa.
Plant: Marcus Hook, Pa.
Raw material: Refinery streams.
Products: Propylene (120,000,000 lb. per year), petroleum sulfonates, naphthenic acids, propylene tetramer (dodecene), propylene trimer (nonene), benzene (800 bbl. per day), toluene (2,000 bbl. per day), mixed xylenes (500 bbl. per day), ammonia (300 tons per day), and sulfur (30 tons per day).
Plant: Toledo, Ohio.
Raw material: Refinery streams.
Products: Butylenes, propylene, hydrogen, and sulfur (12½ tons per day).
• Construction: Plans call for capacity of 100,000,000 lb. per year of naphthalene from refinery streams to be completed late 1961 at cost of $8 million.

SUNOLIN CHEMICAL CO. (Sun Oil Co. and Olin Mathieson Chemical Corp.), 1608 Walnut St., Philadelphia 3, Pa.
Plant: North Claymont, Del.
Raw material: Ammonia and carbon dioxide.
Products: Urea (73,000 tons per year) and hydrogen (10,000 M.c.f.d.).
• Construction: Plant to produce 225,000,000 lb. per year of ethylene and 55,000,000 lb. of ethylene oxide is scheduled for completion late 1961. Existing facilities at adjacent urea plant are being expanded to permit production of 12,000 M.c.f.d. of hydrogen and up to 1,000 M.c.f.d. of carbon monoxide. Cost will be $21 million.

SUNTIDE REFINING CO., Box 658, Corpus Christi, Tex.
Plant: Corpus Christi.
Raw material: Propylene.
Product: Tetramer (150,000 bbl. per year).
Raw material: Naphtha, toluene, and mixed xylenes.
Products: Benzene (1,250 bbl. per day), toluene (1,200 bbl. per day), metaxylene and paraxylene mixture—2% max. orthoxylene (870 bbl. per day), orthoxylene—90% min. orthoxylene (260 bbl. per day), heavy aromatic solvent (140 bbl. per day), and ethylbenzene (30,000,000 lb. per year).
• Construction: New facilities to produce 60,000,000 lb. per year of styrene from refinery gases will be completed spring 1962. Scheduled for completion early 1962 are facilities for making paraxylene from mixed xylenes. Capacity will be 14,000,000 lb. per year. Cost of latter project will be $750,000.

TENNECO CHEMICAL CO. (subsidiary of Tenneco Corp., which is a Tennessee Gas Transmission Co. subsidiary), Box 2511, Houston 1, Tex.
Plant site: Houston Ship Channel area.
• Construction: Now under construction are facilities for 100,000,000 lb. per year of acetylene, 200,000,000 lb. per year of vinyl chloride monomer, and an undisclosed amount of vinyl acetate monomer.

TENNECO OIL CO. (subsidiary of Tenneco Corp., a Tennessee Gas Transmission Co. subsidiary), Box 18, Houston.
Plant: Chalmette, La.
Raw material: From refinery.
Products: Completed mid-1961 were facilities for aromatic solvents, including a 6,000-bbl. per year catalytic reformer, a 2,200-bbl. per day extraction unit, a 22,000,000-lb. per year orthoxylene unit, and a 20,000,000-lb. per year ethylbenzene unit.

TENNESSEE EASTMAN CO. (Eastman Chemical Products, Inc., Kingsport, Tenn.).
Plant: Kingsport.
Raw material: Natural gas.
Product: High-purity hydrogen (900 M.c.f.d.).

TENNESSEE VALLEY AUTHORITY, Division of Chemical Development, Wilson Dam, Ala.
Plant: Noncommercial plant owned and operated by the Government at Wilson Dam.
Raw material: Natural gas.
Product: Ammonia (250 tons per day).

TEXACO INC., 135 E. 42 St., New York 17, N. Y.
Plant: Lockport, Ill.
Raw material: Refinery fractions.
Products: Anhydrous ammonia (220 tons per day of refrigeration, commercial, and agricultural grades), aqua ammonia (industrial and agricultural grades), nitrogen fertilizer solutions, ammonium nitrate solutions, and odorless mineral spirits.
Plant: Los Angeles, Calif.
Product: Sulfur from refinery gas.
Plant: Port Arthur, Tex.
Raw material: Refinery fractions.
Products: Naphthenic acid, oil-layer type of petroleum sulfonates, ethane-ethylene stream, propane-propylene mixture, 1-butene, 2-butene and mixtures, heavy hydrocarbons, olefin polymers, diisobutylene, rust inhibitors, gasoline and lubricating-oil additives, and propylene tetramer.
• Construction: Facilities for production of 30,000,000 gal. per year of benzene set for completion early 1962.
Plant: Westville, N. J. (near Philadelphia).
Raw material: Propylene and benzene.
Product: Cumene (70,000,000 lb. per year).

TEXACO-SEABOARD, INC. (subsidiary of Texaco Inc., 135 E. 42 St., New York 17, N. Y.).
Plant: Silver Tip field, Wyoming.
Product: Sulfur from natural gas (50 long tons per day).

TEXAS BUTADIENE & CHEMICAL CORP., 529 Fifth Ave., New York 17, N. Y.
Plant: Channelview, Tex.
Raw material: Isobutane, n-butane, isopentane, and natural gasoline.
Products: Alkylate, butene-2 concentrate, butene-1 concentrate, propylene concentrate, solvents, and butadiene.
Plant: South Miami, Fla.
Raw material: Styrene and maleic anhydride.
Products: Low molecular-weight resins (1,200,000 tons per year). First year on stream 1961.

TEXAS EASTMAN CO. (Eastman Chemical Products, Inc., Kingsport, Tenn.).
Plant: Longview, Tex.
Raw material: Propane and natural gas.
Products: Ethanol, isobutyraldehyde, normal-butyraldehyde, isobutyl alcohol, isobutyronitrile, n-butyronitrile, acetonitrile, polyethylene (100,000,000 lb. per year), 2-ethylhexyl alcohol, neopentyl glycol, and propionaldehyde. (Aldehydes capacity is 125,000,000 lb. per year.)
• Construction: Initial production has begun in planned 20,000,000-lb. per year polypropylene facility.

TEXAS GAS CORP., Texas Gas Building, Houston, Tex.

Plant: Winnie, Tex.
Product: Benzene concentrate.

TEXAS GULF SULPHUR CO., 75 E. 45 St., New York, N. Y.
Plant: Worland, Wyo.
Product: Sulfur from natural gas (400 tons per day).

TEXAS-U. S. CHEMICAL CO. (Executive office and plant address, Box 667, Port Neches, Tex.)
Plant: Port Neches.
Product: 156,000 gross long tons per year of SBR copolymer and carbon-black masterbatches.

THERMATOMIC CARBON CO., Division of Commercial Solvents Corp., 260 Madison Ave., New York 16, N. Y.
Plant: Sterlington, La.
Product: Carbon black (thermal process).

TIDEWATER OIL CO., 4201 Wilshire Blvd., Los Angeles 5, Calif.
Plant: Avon, Calif.
Raw material: Naphtha fraction.
Products: Mixed aromatics (1,200 bbl. per day).
Plant: Delaware City, Del.
Raw material: Naphtha fraction.
Products: Mixer aromatics (400 bbl. per day) and sulfur (275 tons per day).
Plant: New Hope - Smackover field in Northeast Texas.
Product: Sulfur from natural gas (224 tons per day).

TIDEWATER OIL CO., 4201 Wilshire Boulevard, Los Angeles 5, Calif., and **AIR PRODUCTS, INC.,** 950 Hamilton St., Allentown, Pa.
Plant site: Delaware City, Del.
• Construction: Plans call for facilities with capacity of 30,000,000 lb. per year of oxo alcohols. Tidewater will supply raw material and will operate the plant.

TIDEWATER OIL CO., 4201 Wilshire Boulevard, Los Angeles 5, and **COLLIER CARBON & CHEMICAL CORP.,** Petroleum Building, 714 W. Olympic Boulevard, Los Angeles 15, Calif.
Plant site: Delaware City, Del.
• Construction: Facilities with capacity of 100,000,000 lb. per year of naphthalene are scheduled for completion late 1961.
Plant site: Los Angeles.
• Construction: Facilities with capacity of 50,000,000 lb. per year of naphthalene.

TRANS-JEFF CHEMICAL CORP., owned jointly by Jefferson Lake Sulphur Co. and Transcontinental Gas Pipe Line Corp., Box 296, Houston 1, Tex.
Plant: Tilden, Tex.
Product: Sulfur from natural gas (production first quarter of 1961 was 1,656 long tons.) Output purchased by Jefferson Lake Sulphur Co.

TRETOLITE CO., Division of Petrolite Corp., 369 Marshall Ave., St. Louis 19, Mo.
Plant: St. Louis.
Raw material: Petroleum hydrocarbons and chemicals.
Products: Oil-field production chemicals, corrosion inhibitors, fuel additives, and industrial bactericides.

TRETOLITE CO. OF CALIFORNIA, Division of Petrolite Corp., 200 S. Puente St., Brea, California.
Plant: Brea, Calif.
Raw material: Petroleum hydrocarbons and chemicals.
Products: Oil-field production chemicals, corrosion inhibitors, fuel additives, and industrial bactericides.

TRUBEK LABORATORIES, a subsidiary of Universal Oil Products Co., 30 Algonquin Road, Des Plaines, Ill.
Plant site: East Rutherford, N. J.
• Construction: Scheduled for completion late 1961 are facilities for production of phenyalamines from petroleum aromatics and amines.

UNION CARBIDE CHEMICALS CO., 270 Park Ave., New York 17, N. Y.
Plant: Brownsville, Tex.
Products: Acetic acid, acetic anhydride, and methyl ethyl ketone.
Plant: Institute, W. Va.
Raw material: Natural gas and other petroleum streams.
Products: Acetaldehyde, acetic acid, acetic anhydride, acetone, acetonitrile, acetophenone, acrolein, acrylonitrile, n-butyl alcohol, butyric acid, butyric anhydride, diethylene glycol, diisobutyl ketone, 2-ethylbutanol, ethylene glycol, high-density polyethylene, ethylene oxide, 2-ethylhexanol, n-hexanol. isophorone, isopropanol, mesityl oxide, methyl acetone, 2-methyl-5-ethyl pyridine, methyl isobutyl ketone, paraldehyde, plasticizers, alpha-picoline, gamma-picoline, polyethylene glycols, propionic anhydride, trimethyl nonanone-4, and unox epoxides.
• Construction: Set for completion in 1962 is a plant for 50,000,000 lb. per year of phthalic anhydride based on petroleum naphthalene.
Plant: Seadrift, Tex.
Raw material: Natural gas (ethane).
Products: Polyethylene, ethylene oxide, ethylene glycol, butadiene, 2-ethyl hexanol, and butanol.
Plant: South Charleston, W. Va.
Raw material: Natural gas, refinery gases, crude oil, and other petroleum fractions.
Products: Alcohols; butadiene; esters; ketones; glycol-ethers; plasticizers such as dioctyl phthalate and others; glycols such as ethylene-, di-and-triethylene glylow-density polyethylene; synthetic lubricants; oxides (ethylene and propylene oxides and acetals), aldehydes; organic acids; anhydrides; nitrogen compounds such as acetonitrile, amines (mono, di, and triethanol amines, morpholine and other amines); chlorine compounds such as ethylene dichloride, ethylene and propylene chlorhydrin; aryl chemicals such as acetoacetanlide, 2-methyl 5-ethyl pyridine; surface-active agents (ionics and anionics); and methyl isoamyl ketone.
Plant: Texas City, Tex.
Raw material: Natural gas and refinery gases (ethane, propane).
Products: Acetaldehyde, acetic acid, acetic anhydride, acetone, 2-aminoethyl ethanolamine, n-butyl acetate, n-butyl alcohol, diethylene glycol, diethylene triamine, ethanol, ethyl acetate, ethylene diamine, ethylene dichloride, ethylene glycol, ethylene oxide, butadiene, isobutanol, isopropanol, isopropyl, acetate, methanol, methyl acetone, methylisobutyl ketone, polyethylene, low-density polyethylene, tetraethylene pentamine, trichlorethane, triethylene tetramine, vinyl acetate, vinyl chloride, and other vinyl resins and vinyl plastic materials.
Plant: Torrance, Calif.
Raw material: Refinery cracked gases (ethylene).
Products: Low density polyethylene, ethylene oxide, and ethylene glycol.
Plant: Whiting, Ind.
Raw material: Refinery gases.
Products: Acetic anhydride, acetone, ethanol, ethylene oxide and glycol, isopropanol, methyl ethyl ketone, methyl isobutyl ketone, and polyethylene.

UNION CARBIDE PLASTICS CO. (Division of Union Carbide Corp.).
Plant: Marietta, Ohio.
Raw material: Petroleum-derived stocks.
Products: Styrene plastics, phenol, and epoxy resins (15,000,000 lb. per year).

UNION OIL CO. OF CALIFORNIA, Union Oil Center, Los Angeles 17, Calif.
Plant: Oleum, Calif.
Product: Sulfur from refinery gas (25,000 tons per year).
Plants: Santa Maria, Calif.
Product: Combined capacity of two plants at Santa Maria is 17,500 tons of sulfur per year.
Plant: Wilmington, Calif.
Raw material: Refinery gases and wastes.
Products: Hydrogen sulfide (35,000 short tons per year) and mixture of methyl ethyl mercaptans.

UNITED CARBON CO., INC., Box 1503, Houston 1, Tex.
Plants: Furnace process for production of carbon black used at Aransas Pass and Shamrock, Tex.; Franklin, La.;; and Ryus, Kans.
Plants: Channel process for production of carbon black used at Aransas Pass, Tex. (20,000 M.c.f. per day throughput); Eunice, N. M. (96,000 lb. per day); and Falfurrias, Tex. (12,000 lb. per day).
Plant: Baytown, Tex.
Product: SBR copyolymer (200,000,000 lb. per year).
Plant site: Mojave, Calif.
• Construction: Scheduled for completion by 1962 are facilities with annual capacity of 64,000,000 lb. for carbon black. Cost of plant $5 million. Contractor Lummus Co.

UNIVERSAL OIL PRODUCTS CO., 30 Algonquin Road, Des Plaines, Ill.
Plant: McCook, Ill.
Raw material: Petroleum phenol and olefins and various ketones and amines.
Products: Alkylphenols and phenylenediamine derivatives.
Plant: Shreveport, La.
Raw material: Benzene, nitric acid, and ammonia.
Products: Paranitro-aniline.

U. S. AIR FORCE.
Plant: Near West Palm Beach, Fla.
Product: Liquid hydrogen. (Facilities for this product built and operated by Air Products, Inc.)

U. S. INDUSTRIAL CHEMICALS CO., Division of National Distillers & Chem-

INTERNATIONAL TRADE in petrochemicals is illustrated by this new Japanese petrochemical tanker which made its maiden voyage to Houston earlier this year. The Santai Maru is the first ship in a planned fleet of specialized carriers owned by Mitsui Bussan (Mitsui & Co.). The ship, the first directly owned by a Japanese trading company, carries petrochemicals from Houston to Japan.

ical Corp., 99 Park Ave., New York 16, N. Y.
Plant: Houston Ship Channel.
Raw material: Ethylene.
Product: Conventional polyethylene (200,000,000 lb. per year).
• Construction: National Distillers and Owens-Illinois Glass Co. have formed a new company, National Petro Chemical Corp., which will operate a 60,000,000-lb. per year linear-polyethylene plant scheduled for completion at Houston late 1962. U. S. Industrial Chemicals Co. is supervising construction.
Plant: Tuscola, Ill.
Raw material: Natural gas (ethane).
Products: Polyethylene (100,000,000 lb. per year), ethanol, ethyl ether, ethyl chloride, ammonia, and ammonium nitrate.

U. S. PHOSPHORIC PRODUCTS DIVISION (Tennessee Corp.), Box 3269, Tampa, Fla.
Plant site: Tampa, Fla.
• Construction: Natural gas will be used as raw material for a multimillion-dollar ammonia plant scheduled for completion late 1961. Capacity will be 350 tons per day. Chemical Construction Corp. has the contract.

U. S. RUBBER CO. (See listings for Monochem, Inc., and Naugatuck Chemical.)

VELSICOL CHEMICAL CO., 330 E. Grand Ave., Chicago 11, Ill.
Plant: Galena Park, Tex.
Raw material: Petroleum fractions.
Products: Benzene, toulene, xylenes, aromatic solvent naphthas, and DDT base.
Plant: Marshall, Ill.
Raw material: Pentroleum-base stocks.
Products: Benzene-1°, benzene motor grade, toulenes, xylenes, high-boiling aromatic petroleum solvents, petroleum-derived formulation solvents, and hydrocarbon polymers and resins.

VICKERS PETROLEUM CO., INC., Box 2240, Wichita 1, Kans.
Plant: Potwin, Kans.
Raw material: Catalytic reformate.
Products: Benzene (140 bbl. per day), toluene (350 bbl.), xylenes (350 bbl.), higher aromatic (300 bbl. per day), insecticide components, specialty solvents, and paint solvents.

VISCO PRODUCTS CO., INC., Box 35336, Houston 35, Tex.
Plant: Anaheim, Calif.
Raw material: Petroleum fractions and petroleum chemicals.
Products: Oil-treating chemicals, demulsifiers, corrosion inhibitors scale inhibitors, paraffin aids, and water-flood additives.
Plant: Sugar Land, Tex.
Raw material: Petroleum fractions and petroleum chemicals.
Products: Oil-treating chemicals, demulsifiers, corrosion inhibitors, scale inhibitors, paraffin aids, and water-flood additives.

WARREN PETROLEUM CORP., Box 1589, Tulsa, Okla.
Plant: Fashing, Tex.
Product: Sulfur from natural gas (45 tons per day).
Plant: Waddel, Tex.
Product: Sulfur from natural gas (50 tons per day).

WILSHIRE OIL CO. OF CALIFORNIA, Box 2487, Santa Fe Springs, Calif.
Plant: Santa Fe Springs.
Product: Sulfur from refinery gas (20 tons per day).

WITCO CHEMICAL CO., 122 E. 42 St., New York 17, N. Y.
Plant: Chicago, Ill.
Raw material: Petroleum naphthenic acid, petroleum wax, asphalt fractions, naphthalene, and alkyl benzene.
Products: Metallic naphthenates (paint-drying agents and lube additives), sun-checking inhibitors (rubber compounding), rubber extenders, saturating compounds, insulating mastics, phthalic anhydride (20,000,000 lb. per year), and alkyl-aryl sulfonates (30,000,000 lb. per year).
Plant: Lawrenceville, Ill.
Raw material: Solid petroleum tar and heavy liquid and semisolid petroleum fractions.
Products: Rubber extenders, extending plasticizers, rubber softeners, roofing asphalts, insulating compounds, and potting compounds.
Plant: Los Angeles, Calif.
Raw material: Naphthenic acids.
Products: Metallic naphthenates.
Plant: Perth Amboy, N. J.
Raw material: Solid petroleum tar and heavy liquid and semisolid petroleum fractions.
Products: Rubber extenders, extending plasticizer, rubber softeners, roofing asphalts, potting compounds, and insulating compounds.
• Construction: Facilities to produce 30,000,000 lb. per year of phthalic anhydride from naphthalene scheduled for completion late 1961.

WITFIELD CHEMICAL CORP. (Witco Chemical Co., 122 E. 42 St., New York 17, N. Y., and Richfield Oil Corp., 555 S. Flower St., Los Angeles 17, Calif.).
Plant site: Watson, Calif.
• Construction: A new plant with capacity of 30,000,000 lb. per year of detergent alkylate (docecyl and tridecyl benzene) will be completed late 1961.

WYANDOTTE CHEMICALS CORP., Michigan Alkali Division, Wyandotte, Mich.
Plant: Geismar, La.
Raw material: Ethylene and oxygen.
Products: Ethylene oxide (60,000,000 lb. per year), ethylene glycol, and diethylene glycol.
Plant: Washington, N. J.
Raw material: Propylene oxide and ethylene oxide.
Products: Block polymer surfactants, polypropylene glycols, and urethane-grade polyols.
Plant: Wyandotte, Mich.
Raw material: Petroleum fractions and derivatives.
Products: Ethylene glycol, diethylene glycol, ethylene dichloride, propylene oxide, polypropylene glycols, block polymers, polyoxyalkylene compounds, chloroethers, and aromatic distillates and solvents (chlorinated solvents).
• Construction: A propylene-oxide plant costing $3.5-million is planned at Wyandotte, with construction scheduled to start fall 1961.

THE OIL AND GAS JOURNAL'S 1961 SURVEY OF

Petrochemical plants outside the U. S.

CONSTRUCTION PROJECTS as well as operating plants in 40 countries are included in the Journal's new survey of petrochemical facilities in the free world outside the U. S.

The report lists more than 300 operating plants of which about 175 are in Europe.

More than 200 construction projects are under way or proposed. These include projects at new sites as well as expansion programs.

Figures indicate capacities, and addresses are company headquarters. Dot symbol indicates construction.

ARGENTINA

B. F. GOODRICH CHEMICAL CO., R. T. VANDERBILT CO., INC., and **ATANOR S.A.M.,** Lavalle 348, Buenos Aires. (These companies are associated together in this enterprise.)
Plant: Near Buenos Aires.
Products: Rubber chemicals including accelerators and anti-oxidants. (Some of these are now being made. All products will be in production by early 1962.)

CABOT CORP., 125 High St., Boston 10, Mass.
Plant site: Campana, north of Buenos Aires.
• Construction: The Argentine Government has authorized building of a $4-million carbon-black plant, with capacity of about 30,000,000 lb. per year.

DURANOR (Industrias Quimicas, S.A., Industrial y comercial), formed by Atanor (Cia. Nacional para la Industria Quimica, Lavalle 348, Buenos Aires) and Hooker Chemical Corp., 1200 Forty-seventh St., Niagara Falls, N. Y.
Plant site: Rio Tercero.
• Construction: Scheduled for completion within about a year are facilities to produce 25 tons per day of phenol.

ELECTROCLOR, S.A. (owned by Imperial's Argentine subsidiary, Industrias Quimicas Argentinas Duperial, S.A., and Cellulosa Argentina), Paseo Colon 285, Buenos Aires.
Plant: Rosario.
Product: Polyvinyl chloride.
Plant: Juan Ortiz (near San Lorenzo).
Product: Ammonia.

ESSO, S.A., PETROLERA ARGENTINA, Av. Presidente Roque Saenz Pena 567, Buenos Aires.
Plant: Campana.
Raw material: From refinery.
Products: Aromatics.

FABRICACIONES MILITARES, Cabildo 65, Buenos Aires.
Plant: Rio Tercero.
Products: Ammonia and synthetic nitric acid.

HYDROCARBON - ARGENTINA, S.A. (a joint company formed by Hydrocarbon Research, Inc., and Minera Alumine, Buenos Aires), Bernardo de Irigoyen 248, Buenos Aires.
Plant site: San Lorenzo.
• Construction: A $15-million plant is planned here, for production of benzene, ethylbenzene, orthoxylene, and paraxylene. Yacimientos Petroliferos Fiscales will supply naphtha feed stock to the new plant.

IMPERIAL CHEMICAL INDUSTRIES (See Industrias Quimicas listing).

INDUSTRIAS QUIMICAS ARGENTINAS DUPERIAL, S.A. (Argentine subsidiary of Imperial), Paseo Colon 285, Buenos Aires.
Plant site: Near San Lorenzo, about 200 miles north of Buenos Aires.
• Construction: Scheduled to start construction in summer 1961 is a 10,000-ton per year polyethylene plant. Raw material will be light petroleum distillate. This company is also reportedly planning facilities for phthalic anhydride.

IPAKO (Industrias Petroquimicas Argentinas Koppers, S.A., owned by Koppers and private Argentine interests), Sarmiento 930, Buenos Aires.
Plant site: Ensenada (near Buenos Aires).
• Construction: Scheduled for completion in 1963 is a $25.5-million plant with capacity of 13,200 tons per year of ethylene and 6,900 tons per year of polyethylene.

MONSANTO ANDES, S.A.I.C., Av. L. N. Alem 619, Buenos Aires.
Plant: Mendoza.
Products: Polyvinyl chloride, vinyl chloride monomer, caustic soda, and chlorine. Capacity of plant is approximately 3,000 tons per year.

MONSANTO ARGENTINA, S.A., Av. L. N. Alem 619, Buenos Aires.
Plant: Zarate (near Buenos Aires).
Products: Polyvinyl chloride, phthalic anhydride, isooctyl phthalate plasticizers, and polystyrene (approximately 3,000 tons per year).

PASA (Petroquímica Argentina, S.A., owned by Fish International Corp., Continental Oil Co., Cities Service Co., U. S. Rubber, and Witco Chemical Co.), Viamonte 632, Buenos Aires.
Plant site: Santa Fe Province.
• Construction: Scheduled for completion at intervals ranging from 18 to 36 months are nine interrelated plants. Work is scheduled to start in October 1961. Design capacity will be 32,000 tons per year of butadiene, 14,000 tons of styrene, 35,000 tons of SBR, 10,000 tons of cis-polybutadiene, 11,500 tons of chemical intermediates, and 850 bbl. per day of benzene. Feed stocks of distillate, propane, and carbon black will come largely from YPF's oil and gas fields, with some stocks coming from the San Lorenzo refinery. Cost of the plants has been estimated at about $70 million.

YACIMIENTOS PETROLIFEROS FISCALES, Av. Presidente Roque Saenz Pena 777, Buenos Aires.
Plant: San Lorenzo.
Raw material: Refinery.
Product: Isopropyl alcohol (approximately 1,200 tons per year).
• Construction: For new project, see Hydrocarbon-Argentina listing.

Handy reference:

Survey copies available

Reprints of the foreign petrochemical survey are available at $2 each. The U. S. survey, starting on Page 122, is also available in a separate reprint at $2 each. Send requests to Reader Service, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

AUSTRALIA

ALTONA PETROCHEMICAL CO. PTY., LTD. (owned by Vacuum Oil Co. Pty., Ltd.), Maidstone Road, Altona, Victoria.
Plant: Altona.
Products: Ethylene (45,000 tons per year) and butadiene (21,000 tons per year). This plant was to go on stream August 1961.

AUSTRALIAN CARBON BLACK PTY., LTD. (owned jointly by Cabot Corp., 125 High St., Boston, Mass., and United Carbon Co., Inc., 410 Park Ave., New York.)
Plant: Millers Road, Altona.
Raw material: Heavy residual oil, imported from U. S.
Products: Eight types of carbon black (60,000,000 lb. per year).

AUSTRALIAN FLUORINE CHEMICALS PTY., LTD. (owned 50% by Monsanto Chemicals, Australia, Ltd., and 50% by Consolidated Zinc Pty., Ltd.), Somerville Road, West Footscray, Victoria.
Plant site: Darling Road, Rozelle, New South Wales.
• Construction: Facilities for manufacture of fluorocarbons will be on stream late 1961.

AUSTRALIAN PETROCHEMICALS PTY., LTD. (owned 55% by Monsanto Chemical Co., St. Louis, Mo., and 45% by Petrochemical Holdings, Ltd.), Lidcombe, New South Wales.

Plant: Silverwater, New South Wales.
Products: Styrene monomer and ethylbenzene.

AUSTRALIAN SYNTHETIC RUBBER CO., LTD. (owned by Vacuum Oil Co. Pty., Ltd., and Goodyear Tyre & Rubber Co., Australia, Ltd.), Maidstone Road, Altona, Victoria.
Plant: Altona.
Raw material: From adjacent butadiene-ethylene plant.
Product: Styrene-butadiene rubber (30,000 long tons per year of dry polymer or 36,000 long tons of oil-extended polymer).

B. F. GOODRICH-CSR CHEMICALS PTY., LTD. (owned 60% by B. F. Goodrich Co., Akron, Ohio, and 40% by CSR Chemicals Pty., Ltd.), Kororoit Creek Road, Altona, Victoria.
Plant: Altona.
Raw material: Importing ethylene dichloride until supplies are available from CSRC-Dow Pty., Ltd.
Product: Polyvinyl-chloride plastic resins.

COMMERCIAL SOLVENTS PTY., LTD., affiliated with Petroleum Chemical Corp. (Australia), Ltd.
• Construction: Facilities to use aromatics as raw materials.

CSR CHEMICALS PTY., LTD., Mary St., Rhodes, New South Wales.
Plant: Rhodes.
Product: Polystyrene plastic.

CSRC-DOW PTY., LTD. (Dow Chemical Co. and CSR Chemicals Pty., Ltd.), 2 City Road, Melbourne.
Plant: Altona, Victoria.
Raw material: Ethylene, benzene, and salt.
Products: Styrene monomer, chlorine, and caustic soda. These facilities were to go on stream August 1961.

IMPERIAL CHEMICAL INDUSTRIES OF AUSTRALIA & NEW ZEALAND, LTD., 1 Nicholson St., Melbourne.
Plant: Botany (near Clyde), New South Wales.
Products: Polyethylene and polyvinyl chloride.
• Construction: Capacity will be expanded. Raw materials will come from Shell Chemical's ethylene plant which is under construction at Clyde. The company will reportedly spend $14 million for capacity of 63,000 long tons per year of ammonia, ammonium nitrate, methanol, urea, and nitric acid.

PETROLEUM & CHEMICAL CORP. (AUSTRALIA), LTD.
Plant: Silverwater, New South Wales.
Products: Benzene, toluene, and xylene.

SHELL CHEMICAL (AUSTRALIA) PTY., LTD., 155 William St., Melbourne.
Plant: Geelong, Victoria.
Raw material: From Shell refinery.
Products: Sulfuric acid (120 tons per day) and detergent alkylate (7,000 tons per year).
Plant: Clyde, New South Wales.
Raw material: Bisphenol-A from Union Carbide's Rhodes plant, and epichlor hydrin from Shell Holland.
Product: Epoxy resins.
• Construction: A £10,000,000 ethylene plant is due on stream by 1962. The plant, which is a joint venture with ICIANZ, will feed the latter's polyethylene plant at Botany.

SWIFT & BORDEN CHEMICAL CO. PTY., LTD. (owned jointly by Swift & Co., Ltd., and Borden Chemical), Granville, New South Wales.
Plant site: Sydney.
• Construction: Formaldehyde plant, with 13,000,000 lb. per year initial capacity.

UNION CARBIDE AUSTRALIA, LTD., (owned 60% by Union Carbide Corp., 30 E. 42 St., New York 17, and 40% by Australian public).
Plant: Rhodes, New South Wales.
Product: Bisphenol-A, which is used as raw material at Shell's epoxy-resin plant at Clyde.
Plant site: Altona, adjacent to Altona Petrochemical's plant.
• Construction: Building a 30,000,000-lb. per year polyethylene plant with first stage scheduled on stream late 1961. Cost £3,000,000.

VACUUM OIL CO. PTY., LTD., 2 City Road, Melbourne.
Plant: Altona.
Raw material: From refinery.
Product: Sulfur (40 tons per day).

AUSTRIA

DANUBIA PETROCHEMIE, A.G. (joint subsidiary of Oesterreichische Stickstoffwerke, A.G.—Austrian Nitrogen Works—and Montecatini), Brauhausgasse 9, Vienna.
Plant: Schwechat (near Vienna).
Raw material: Petroleum.
Product: Isotactic polypropylene (11,000,000 lb. per year).

FARBEWERKE HOECHST, A.G., Schwechat, Vienna.
Plant site: Not yet decided.
• Construction: Under consideration is a high-density polyethylene plant.

OESTERREICHISCHE HIAG-WERKE, A.G., Gluckgasse 2, Vienna 1.
Plant: Fischamend, N.O.
Raw material: Natural gas.
Product: 10,000 tons per year of methanol.
• Construction: Scheduled for completion end of 1961 are additional facilities for 8,000 to 10,000 tons per year of methanol from natural gas.

OESTERREICHISCHE MINERALOEL VERWALTUNGS, A.G., Otto Wagner Platz 5, Vienna 9.
Plant site: Schwechat.
• Construction: Plans call for a new unit for recovery of naphthenic acid from petroleum.

VEDEPHA, G.M.B.H.
Product: Polyvinyl acetate.

VEREINIGTE CHEMISCHE FABRIKEN KREIDL, RUTTER & CO., Sebastian Kohlgasse 3-9, Vienna 21.
Plant: Vienna.
Raw material: Methanol.
Product: 20,000 tons per year of formaldehyde.

BELGIUM

AMOCO FINA, S.A., owned jointly by Amoco Chemicals Corp. and Petrofina. (Home office is 130 E. Randolph Drive, Chicago, Ill.)
Plant: Antwerp.
Products: Additives for petroleum products.

BAYER.
Plant: Antwerp area.

COBENAM, S.A. (subsidiary of Union Carbide Corp. and Ste. Chimique des Derives du Petrole, S.A.) Post Office Box 10, Antwerp.
Plant site: Antwerp.
• Construction: Scheduled for completion late 1961 are facilities for production of 30,000,000 lb. per year of polyethylene.

MONSANTO (BELGIUM), S.A. (SIDAC and Monsanto Chemicals).
Plant: Ghent.
Product: Polyvinyl butyral sheets.

PETROCHIM (Ste. Chimique des Derives du Petrole), Avenue de l'Escaut, Anver.
Plant: Antwerp.
Raw material: Gases from refineries at Antwerp.
Products: Ethylene, propylene, ethylene oxide, ethylene glycol, diethylene glycol, cumene, phenol, acetone, propylene trimer, propylene tetramer, detergent alkylate, a-methylstyrene, acetophenone, and dodecylbenzene. (Total production of basic materials at the plant is 40,000 tons per year.)

SIBP (Ste. Industrielle Belge des Petroles, owned by Petrofina and BP), Post Office Box 55, Anvers (Kruisschans).
Plant: Antwerp.
• Construction: Existing refinery here will be expanded, increasing capacity of LRG and making possible recovery of up to 60 tons per day of sulfur.

UNION CHIMIQUE BELGE, S.A., 61 Avenue Louise, Brussels 5.
Plant: Schoonaarde.
Product: Phthalic anhydride (15,000 metric tons per year).

BRAZIL

ALBA (Adesivos e Lacticinios Brasil-America), Caixa Postal 438, Sao Paulo.
Plant: Cubatao, near Sao Paulo.
Products: 30 tons per day of methanol, formaldehyde, and synthetic resins.

BAKOL COMERCIO E INDUSTRIA, S.A.
Plant: Sao Paulo.
Product: Styrene (10,000 tons per year).

CIA. DE CARBONS COLOIDAIS (subsidiary of Koppers Co., Inc., Koppers Building, Pittsburgh 19, Pa.).
Plant: Sao Paulo.
Product: Styrene (5,000 tons per year).

CIA. DE CARBONS COLOIDAIS.
Plant site: Mataripe.
• Construction: This company was to complete facilities for 15,000 tons per year of carbon black in 1961.

CIA. DEODORO INDUSTRIAL.
Plant: Rio de Janeiro.
Product: 4,500 tons per year of urea and formaldehyde.

CIA. QUIMICA RHODIA BRASILEIRA

(associated with the French firm, Rhone-Poulenc, 21 Rue Jean Goujon, Paris 8).
Plant: Sao Paulo.
Products: Vinyl acetate (4,000 tons per year) and nylons (2,160 tons per year).

COPEBRAS (Cia. Petroquimica Brasileira, of which major partners are Columbian Carbon Co., 380 Madison Ave., New York 17, with a 46% interest, and Celanese Corp. of America, 180 Madison Ave., New York 16).
Plant: Near Cubatao.
Product: Carbon black (furnace process).

COPENAL (Cia. Petroquimica Nacional, established by Bakol, S.A.; Trol, S.p.A.; and others).
• Construction: Plans call for facilities to produce 5,000 tons per year of low-pressure polyethylene.

INDUSTRIA CHEMICA BRASIL.
• Construction: Ziegler-type polyethylene plant.

INDUSTRIA QUIMICA PRODUCTOS FTALICOS. S. A. (W. R. Grace & Co., 7 Hanover Square, New York 5, N. Y.)
Plant site: Sao Paulo.
• Construction: Set for completion late 1961 are facilities with capacity of 6,000 tons per year of phthalic anhydride from naphthalene.

NORTH AMERICAN SOLVAY, INC.
Plant: Sao Paulo.
Product: Ethylene and polyethylene.

PETROBRAS (Petroleo Brasileiro, S.A., Ave. Rio Branco 81, Rio de Janeiro).
Plant site: Near Rio de Janeiro.
• Construction: Firestone Tire & Rubber Co. and Goodyear Tire & Rubber Co. are building a synthetic-rubber plant near Petrobras' refinery. The 40,000-ton per year plant is scheduled for completion in 1962. Ethylene and aromatics facilities will also be installed.
Plant: Cubatao, near Sao Paulo.
Raw material: Refinery feed stocks.
Products: Polyethylene (4,500 tons per year), urea, and ammonia.

UNION CARBIDE DO BRASIL.
Plant: Cubatao.
Raw material: Refinery feed stocks.
Product: Polyethylene (4,500 tons per year).
• Construction: Seeking authority to more than double capacity.

CANADA

B-A SHAWINIGAN, LTD. (Shawinigan Chemicals, Ltd.), Box 338, Montreal 3, Que.
Plant: Montreal.
Raw material: Cumene.
Products: Phenol (more than 40,000,000 lb. per year), acetone (more than 24,000,000 lb. per year), isopropanol, a-methyl styrene, and bis-phenol.

BRITISH AMERICAN OIL CO., LTD., 800 Bay St., Toronto 5, Ont.
Plant: Montreal, Que.
Raw material: Reformate.
Product: Benzene (6,000,000 gal. per year).
• Construction: Building of new facilities to make benzene from toluene will start early 1962.

Plant: Nevis gas-processing plant in Alberta.
Product: Sulfur from natural gas (70 long tons per day-.
Plant: Pincher Creek field, Alberta.
Product: Sulfur from natural gas (675 long tons per day-.
Plant: Rimbey gas-processing plant, Alberta.
Product: Sulfur from natural gas (233 long tons per day).
Plant site: Clarkson, Ont.
• Construction: Building of new facilities to make cyclohexane from benzene will get under way early 1962.

BROCKVILLE CHEMICALS, LTD. (subsidiary of Sogemines, Ltd.), Maitland, Ont.
Plant: Maitland.
Raw material: Natural gas.
Products: Hydrogen, nitric acid, ammonium nitrate, nitrogen solutions, and other ammonia derivatives.

CABOT CARBON CO. OF CANADA, LTD., Box 305, Sarnia, Ont.
Plant: Sarnia.
Raw material: Petroleum fractions.
Product: Oil-type furnace black (more than 55,000,000 lb. per year).

CALIFORNIA STANDARD CO., Medical Arts Building, Calgary, Alta.
Plant: Nevis field, near Stettler, Alta.
Product: Sulfur from natural gas (120 long tons per day).

CANADIAN CHEMICAL CO., LTD., (subsidiary of Celanese Chemical Corp.), Box 99, Edmonton, Alta.
Plant: Clover Bar (near Edmonton).
Raw materials: Refinery gases, propane, butanes, and oxygen.
Products: Pentaerythritol (12,000 tons per year), methanol (20,000 tons per year), propylene glycol, n-propanol, methyl isobutyl carbinol, other alcohols, acetates, acetic acid, anhydride, acetone, methyl isobutyl ketone, solvents, formaldehyde, frothing agents, xanthates, and cellulose acetates (23,000 tons per year).

CANADIAN FINA OIL, LTD., Bamlett Building, Calgary, Alta.
Plant site: Wildcat Hills field, Alberta.
• Construction: Plans call for a gas-processing plant here, with sulfur-recovery facilities.

CANADIAN INDUSTRIES, LTD., Box 10, Montreal, Que.
Plant: Beloeil, Que.
Raw material: Pentaerythritol.
Product: Pentaerythritol tetranitrate.
Plant: Edmonton, Alta.
Raw material: Natural gas from which ethane is obtained.
Product: Polyethylene (40,000,000 lb. per year).
Plant: Millhaven, Ont.
Raw materials: Ethylene glycol and dimethyl terephthalate.
Products: Synthetic polyester fiber and flake.
Raw material: Bunker C fuel oil.
Product: Anhydrous ammonia (200 tons per day).

CANADIAN-MARIETTA CO. (affiliated with American-Marietta Co., 3400 Thirteenth Ave. SW, Seattle 4, Wash.).
Plants: Edmonton, Alta.; New Westminster, B. C.; Richmond, Calif.; Portland, Ore.; and Newark, Ohio.
Raw material: Phenol, formaldehyde, urea, and caustic.
Product: Synthetic resins (125,000,000 lb. per year).

CANADIAN OIL COMPANIES, LTD., 188 University Ave., Toronto 1, Ont.
Plant: Corunna (Sarnia), Ont.
Raw material: Refinery streams.
Products: Benzene, toluene, xylene, aromatic solvents, paraffinic solvents, hydrogen, methane, ethane, ethylene, propane-propene, and butane-butene. Completed in May 1961 were new facilities with capacity of 12,600 gal. per day of benzene from toluene.
Plant: Innisfail field, Alberta.
Product: Sulfur from natural gas (80 long tons per day).

COLUMBIAN CARBON (CANADA), LTD., (subsidiary of Columbian Carbon Co., 380 Madison Ave., New York 17, N. Y.)
Plant site: Toronto, Ont.
• Construction: Facilities to produce 40,000,000 lb. per year of oil furnace blacks scheduled for completion September 1961 at cost of $5 million.

CONSOLIDATED MINING & SMELTING CO. OF CANADA, LTD., Trail, B. C.
Plant: Turner Siding, Alta.
Raw material: Natural gas.
Products: Ammonia (320 tons per day), ammonium nitrate (200 tons per day), and foliar-grade and prilled urea (100 tons per day).

CYANAMID OF CANADA, LTD. (subsidiary of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.).
Plant: Welland, Ont.
Raw material: Natural gas.
Products: Ammonia, ammonium nitrate, and nitric acid.

DEVON-PALMER OILS, LTD. (See listing for Texas Gulf Sulphur Co.)

DOW CHEMICAL OF CANADA, LTD., Sarnia, Ont.
Plant: Sarnia.
Raw material: Refinery gas and liquid streams, benzene, butadiene, salt, and lime.
Products: Anhydrous hydrogen chloride, calcium chloride, carbon tetrachloride, caustic soda, chlorine, diethanolamine, diethylene glycol, dichloroethyl ether, ethanolamine ethyl chloride, ethylene chloride, ethylene glycol, ethylene oxide, hydrochloric acid, perchloroethylene, polystyrene foam, styrene, styrene butadiene latexes, trichloroethylene, triethanolamine, triethylene glycol, vinyl chloride, ammonia, linear polyethylene, expandable polystyrene beads, methyl chloride, methylene chloride, and Zoamix.
• Construction: Latex unit and stream plant are being expanded at Sarnia. Now in the engineering stage are facilities for propylene oxide, propylene glycol, polyglycol, polyethlene, and polypropylene.
Plant: Fort Saskatchewan, Alta.
Product: Pentachlorophenol, glycols, and ethanolamines.

• Construction: Now in the engineering stage are facilities for manufacture of weed killer.
Plant: Ladner (Vancouver), B. C.
Raw materials: These include benzene.
Product: Phenol (24,000,000 lb. per year).

DU PONT OF CANADA, LTD., Box 660, Montreal, Que.
Plant: Kingston, Ont.
Product: Nylon resin and fibers.
Plant: Maitland, Ont.
Raw material: Cyclohexane, ammonia, carbon tetrachloride, chloroform, polyacrylonitrile, and hydrofluoric acid.
Products: Adipic acid, hexamethylene diamine (nylon intermediates), chlorofluoromethanes, acrylic fiber, and hydrogen peroxide.
Plant: Saria, Ont.
Product: Low-pressure polyethylene.

ETHYL CORP. OF CANADA, LTD., 48 St. Clair Ave. W, Toronto, Ont.
Plant: Sarnia, Ont.
Raw material: Anhydrous HCl and ethylene.
Products: Tetraethyl lead, ethyl chloride, and ethylene dichloride.

HOME OIL CO., LTD., 304 Sixth Ave. W, Calgary, Alta.
Plant site: Carstairs-Elkton Unit, near Calgary. Alta.
• Construction: Scheduled for completion in November 1961 is a new gas-processing plant, with recovery capacity to include 1,413 long tons of sulfur per day.

IMPERIAL OIL LTD., 111 St. Clair Ave. W, Toronto 7, Ont.
Plant: Redwater field, Alberta.
Product: Sulfur from natural gas (10 tons per day).
Plant: Sarnia, Ont.
Raw materials: Propylene, benzene, straightrun virgin naphthas, and crude fractions.
Products: Detergent alkylates (30,000,000 lb. per year), nonene, tetrapropylene, heavy alkylates, and petroleum solvents (600,000 bbl. per year), as well as ethylene, propylene, butylenes, butadiene, aromatic distillates, and aromatic tars. (Cracking plant for ethylene and other products involves capacity of 10,000 bbl. per day of feed stock.
• Construction: Scheduled for completion fall 1961 are facilities with capacity for 30,000,000 gal. per year of benzene.

IRVING REFINING, LTD., Box 1260, St. John, N. B.
Plant: St. John.
Product: Sulfur from refinery gas (20 long tons per day).

JEFFERSON LAKE PETROCHEMICALS OF CANADA, LTD., Whitney Building, New Orleans, La.
Plant: Fort St. John, B. C.
Product: Sulfur from natural gas (300 tons per day).
Plant site: East Calgary field, Alberta.
• Construction: A new gas-processing plant will be completed here late 1961 by Petrogas Processing, Ltd. Product capacity will include 860 long tons per day of elemental sulfur. Jefferson Lake will operate sulfur-recovery facilities.
Plant site: Savanna Creek (Coleman, Alberta).
• Construction: Product capacity of new gas-processing plant to be completed here late 1961 by Saratoga Processing Co., Ltd., will include 375 long tons of sulfur per day. Jefferson Lake to operate sulfur-recovery facilities.

LAURENTIDE CHEMICALS & SULPHUR, LTD., Montreal East, Que.
Plant: Montreal East.
Raw material: Refinery gas and waste alkylation H_2SO_4.
Product: Sulfur (100 tons per day).

LUBRIZOL OF CANADA, LTD., Box 26, Niagara Falls, Ont.
Plant: Niagara Falls.
Raw material: Petroleum fractions.
Products: Lube-oil additives.

MONSANTO CANADA, LTD., Box 900, Montreal 3, Que.
Plant: Montreal.
Raw material: Styrene.
Product: Polystyrene (20,000,000 lb. per year).
Plant: LaSalle, Que.
Raw material: Benzol and benzene.
Product: Maleic anhydride (several million pounds per year).

NEW SURPASS PETROCHEMICALS, LTD., 80 Richmond St. W, Toronto, Ont.
Plant: Scarborough, Ont.
Raw material: Petroleum fractions, heavy alkylate, and petroleum oxidates.
Products: Petroleum sulfonates and derivatives, lubricating greases, oil additives, and rust preventives.

NORTHWEST NITRO-CHEMICALS, LTD., Box 720, Medicine Hat, Alta.
Plant: Medicine Hat.
Raw material: Natural gas.
Products: Ammonia, high-analysis nitrogen, and phosphate fertilizers.

PAN AMERICAN PETROLEUM CORP., Box 591, Tulsa, Okla.
Plant site: Windfall field, 25 miles west of Whitecourt, Alta.
• Construction: New gas-processing plant to be built here will include capacity for recovery of 650 long tons of sulfur per day. Completion 1962.

PETROGAS PROCESSING, LTD. (See Jefferson Lake Petrochemicals of Canada, Ltd., listing for details on sulfur-recovery facilities at Petrogas' new gas-processing plant.)

POLYMER CORP., LTD. (Crown owned), Vidal St. S, Sarnia, Ont.
Plant: Sarnia.
Raw material: Refinery streams.
Products: Styrene and butadiene monomers, styrene butadiene, butyl and nitrile rubbers, ethylene, isobutylene, and special latices. (Production of all types of rubber is 155,000 to 160,000 long tons per year.)
• Construction: Scheduled for completion before the end of 1962 are facilities for production of 20,000 tons per year of polybutadiene synthetic rubber. Contractor is Catalytic Construction of Canada, Ltd. Scheduled for completion in fall 1961 is a new butadiene extraction unit, with Fluor Corp. of Canada, Ltd., contractor. Due for completion late 1961 are new facilities to produce a range of black masterbatch rubbers.

REGENT REFINING (CANADA), LTD., (subsidiary of Texaco Canada Ltd.), 1425 Mountain St., Montreal 25, Que.
Plant: Port Credit, Ont.
Raw material: From refinery.
Product: Benzene (3,500,000 gal. per year).

REICHHOLD CHEMICALS (CANADA), subsidiary of Reichhold Chemicals, Inc., RCI Building, White Plains, N. Y.
Plant, Ste. Therese, Que.
Raw material: Petroleum naphthalene and petroleum solvents.
Product: Phthalic anhydride.
Plant: Toronto, Ont.
Raw material: Formaldehyde, phenol, petroleum solvents, glycerine, and phthalic anhydride.
Products: Phenol-formaldehyde resins, urea-formaldehyde resins, and alkyl resins.
Plant site: Port Moody, B. C.
• Construction: Plans call for a new phenol and formaldehyde unit.

ROYALITE OIL CO., LTD., Royalite Building, Calgary, Alta.
Plant: Turner Valley, Alta.
Product: Sulfur from natural gas (25 to 40 tons per day).

SARATOGA PROCESSING CO., LTD. (See Jefferson Lake Petrochemicals of Canada, Ltd., listing for details on sulfur-recovery facilities at Saratoga's new gas-processing plant.)

SHAWINIGAN CHEMICALS, LTD. (See listing for St. Maurice Chemicals, Division of Shawiningan Chemicals, Ltd.)

SHELL OIL CO. OF CANADA, LTD., 505 University Ave., Toronto, Ont.
Plant: Jumping Pound, Alta.
Product: Sulfur from natural gas (90 long tons per day).
Plant: Montreal, Que.
Raw material: Propylene, butylenes, and benzene.
Products: Isopropyl alcohol, acetone, secondary butyl alcohol, methyl ethyl ketone, epoxy resins, and detergent alkylate.
Plant site: Waterton-Pincher Creek area, Alberta.
• Construction: Scheduled for completion end of 1961 is a gas-processing plant with product capacity to include 1,000 long tons per day of sulfur.

SHERRITT GORDON MINES, 2918-25 King St. W, Toronto, Ont.
Plant: Fort Saskatchewan, Alta.
Raw material: Natural gas.
Products: Ammonia (180 tons per day) and ammonium sulfate (120,000 tons per year).

SOGEMINES, LTD. (See listing for subsidiary, Brockville Chemicals, Ltd.)

ST. MAURICE CHEMICALS, Division of Shawinigan Chemicals, Ltd., 600 Dorchester St. W, Montreal, Que.
Plant: Varennes, Que.
Products: Formaldehyde and pentaerythritol.
• Construction: Company will build a plant on the St. Lawrence River initially involving manufacture of acetaldehyde from ethylene. British American Oil Co.,

Ltd., part-owner of Shawinigan, will supply feed stock.

STEELMAN GAS, LTD., 706 Seventh Ave. W, Calgary, Alta.
Plant: Steelman field, Saskatchewan.
Product: Sulfur from natural gas (9 long tons per day).

SUN OIL CO., LTD., 85 Bloor St. E, Toronto 5, Ont.
Plant: Sarnia, Ont.
Raw material: Crude oil.
Products: Butylenes.

TEXACO CANADA LTD. (See listing for subsidiary, Regent Refining.)

TEXAS GULF SULPHUR CO., 75 East 45 St., New York.
Plant: Okotoks field near Calgary, Alta. (formerly listed as Devon-Palmer Oils, Ltd., which shares ownership of plant with Texas Gulf and Shell Oil of Canada, Ltd.).
Product: Sulfur from natural gas (356 long tons per day).

UNION CARBIDE CANADA, LTD., Chemicals and Plastics Division, 123 Eglington Ave. E, Toronto 12, Ont.
Plant: Montreal East, Que.
Raw material: Refinery gases.
Products: Ethylene (captive), ethylene oxide, ethylene glycols, polyethylene glycols, glycol ethers, ethanolamines, and polyethylene.

COLOMBIA

AMONIACO DEL CARIBE, affiliate of International Petroleum (Colombia), Ltd,. Apartado Aereo 3533, Bogota.
Plant site: Cartegena.
• Construction: Work on a $13-million plant, for production of 325 tons per day of ammonia and 167 tons per day of nitric acid, began in mid-1961. The ammonia will be used to make nitrogenous and mixed fertilizer. Raw material will come from IPC refinery gases and naphtha.

B. F. GOODRICH CHEMICAL CO., 3135 Euclid Ave., Cleveland, Ohio, (with Colombian partners).
Plant site: Near Bogota.
• Construction: Facilities to produce polyvinyl chloride.

INDUSTRIA COLOMBIANA DE FERTILIZANTES (Montecatini).
Plant: Barrancabermeja (El Centro).
Raw material: Natural gas.
Product: Ammonia.

SINTETICOS, S.A.
• Construction: Facilities for polyvinyl chloride.

W. R. GRACE & CO., 7 Hanover Square, New York 5, N. Y.
Plant site: Bogota.
• Construction: Plans call for a phthalic anhydride plant with capacity of 60 tons per month.

DENMARK

DANBRITKEM, A.S. (owned by two Danish companies, Dampskibsselskabet Svendborg and Dampskibsselskabet af 1912, together with Imperial Chemical Industries), Kongens Nytorv 8, Copenhagen K.
Plant site: Copenhagen.
• Construction: Facilities to produce 15,000 tons per year of polyolefins. Feed stock from Maersk refinery.

DANSKE SPRITFABRIKKER, A.S., Havnegade 29, Copenhagen.
Plant: Copenhagen.
Raw material: Ethylene.
Product: Ethanol.

MOLLER, A.P., Kongens Nytorv 8, Copenhagen.
Plant: Maersk.
Raw material: Naphtha.
Products: Steam cracked products.

EGYPT

UNITED ARAB REPUBLIC.
Plant site: Suez area.
• Construction: The UAR plans a new refinery, which would provide raw materials for a proposed petrochemical complex costing about $75 million. Capacities would include 5,000 metric tons per year of polyvinyl chloride, 200,000 metric tons per year of calcium nitrate fertilizer, 28,000 tons of ethyl alcohol, 10,000 tons of synthetic rubber, 17,400 tons of glycerol, 6,000 tons of low-pressure polyethylene, 3,000 tons of polystyrene, 5,000 tons of benzene or 9,000 tons of toluene, 28,000 tons of sulfur, 6,000 tons of dodecylbenzene, and 4,000 tons per year of acrylic fiber.

EL SALVADOR

CONTINENTAL OIL CO., Box 2197, Houston 1, Tex., and **NATIONAL BULK CARRIERS, INC.,** 360 Lexington Ave., New York 17, N. Y.
Plant site: Acajutla.
• Construction: These two companies have proposed to the El Salvador Government the construction of a $6-million ammonia plant.

FARBENFABRIKEN BAYER, A.G., Leverkusen, Germany, and local interests.
• Construction: Facilities for production of insecticides.

FERTILIZANTES DE CENTRO AMERICA, S.A. (owned by private investors from Central America and International Development & Investment Co., Ltd. The latter is partly owned by Phoenix-Rheinruhr).
• Construction: Plant to produce 180,000 tons per year of fertilizers.

FINLAND

NESTE OY, Kaivokatu 10, Helsinki.
Plant site: Naantali.
• Construction: Original plans for a nitrogen-fertilizer plant at refinery location here postponed because the company is currently expanding the refinery from 25,000 to 50,000 bbl. per stream day capacity.

TYPPI OY, Oulu.
Plant: Oulu.
Raw material: Petroleum and coal.
Product: Nitrogen fertilizers.
• Construction: An expansion of nitrogen production is planned. Completion is expected end of 1962.

FORMOSA

CHINESE PETROLEUM CORP.
Plant: Chia-yee.
Raw materials: Naphtha.
Product: Solvents.
Plant: Koahsiung.
Raw material: Refinery gas, natural gas, and naphtha.
Products: Aromatics, carbon black, and sulfur (10 tons per day).

FRANCE

ACETALACQ (Ste. Acetalacq), 21 Rue Jean Goujon, Paris 8.
Plant: Lacq.
Product: Acetaldehyde.

ANTAR PETROLES DE L'ATLANTIQUE, 4 Rue Leon Jost, Paris 17.
Plant: Donges.
Raw material: Aromatic and paraffinic hydrocarbons.
Products: Propylene, benzene, toluene, xylenes, and solvents.

AQUITAINE CHIMIE (Ste. des Produits Chimiques d'Aquitaine), 41 Avenue de l'Opera, Paris.
Plant: Lacq.
Raw material: Methane.
Products: Acetylene, ammonia, and methanol.

ATLANTIQUE - PROGIL - ELECTROCHIMIE (Ste. Atlantique - Progil - Electrochimie), 79 Rue de Miromesnil, Paris 8.
Plant: Donges (Loire-Atlantique).
Raw materials: Propylene and benzene.
Product: Cumene.

AZOLACQ (Ste. Chimiques d'Engrais et de Produits de Synthese du Sud Ouest), 45 Avenue George V, Paris 8.
Plant: Lacq.
Raw material: Ammonia.
Products: Nitrogen fertilizers and urea (60,000 metric tons per year of nitrogen content).

CABOT FRANCE (Ste. Cabot-France), 45 Rue de Courcelles, Paris 8.
Plant: Berre (near Marseille).
Product: Carbon black.

CALIFORNIE - ATLANTIQUE (Ste. Californie-Atlantique, owned by California Chemical Co. and Ste. Petrochimique de l'Atlantique), 4 Rue Leon Jost, Paris 17.
Plant: Donges.
Raw material: Aromatics from Antar refinery.
Product: Paraxylene (8,500 tons per year).

CALIFORNIA CHEMICAL, S.A.F. (subsidiary of California Chemical Co., 200 Bush St., San Francisco, Calif.).
Plant: Port de Bouc.
Raw material: Petroleum-base stocks.
Products: Fungicides.

CARBON BLACK (Cie. Francaise du Carbon Black, S.A., owned by Continental Carbon Co., Houston, Tex., and Phillips Petroleum Co., Bartlesville, Okla.), Boite Postale No. 3, Ambes (Gironde).
Plant: Ambes (Bordeaux area).
Product: Carbon black (56,000,000 lb. per year of FEF, HAF, and ISAF).

CFR (Cie. Francaise de Raffinage), 5 Rue Michel Ange, Paris 16.

Plant: La Mede.
Product: Propylene (50 tons per day).
Plant: Gonfreville.
Raw material: Light naphtha.
Products: Propylene (50 tons per day), hydrogen sulfide, propylene tetramer, propylene trimer, butylene dimer, isobutylene, and ethylene (30,000 tons per year).

CFR (Cie. Francaise de Raffinage) and **EL PASO FRANCE-AFRIQUE, S. A.** (with the latter owned 85% by El Paso Natural Gas Products Co., Box 1161, El Paso, Tex.).
Plant site: Le Harve.
• Construction: A $17-million plant, with capacity of 44,000,000 lb. per year of high-pressure polyethylene resins, will be completed early in 1963. Feed stock will come from CFR's adjacent refinery.

COURRIERES-KUHLMANN (Ste. de Produits Chimiques Courrieres-Kuhlmann), 25 Boulevard de l'Amiral Bruix, Paris 16.
Plant: Harnes.
Raw material: Olefins.
Products: Oxo alcohols, methanol and higher alcohols, ammonia, sulfuric acid, and ammonium sulfate.

EL PASO FRANCE-AFRIQUE, S.A. (See listing for CFR.)

ESSO STANDARD, 82 Avenue des Champs-Elysees, Paris 8.
Plant: La Mailleraye.
Products: Lube-oil additives.
Plant: Port Jerome.
Raw material: Light naphtha from Esso refinery.
Products: Ethylene, propylene, butadiene, isobutylene, tetrapropylene, tripropylene, lubricant additives, and dodecylbenzene.
• Construction: A $7-million plant with capacity of 45,000 metric tons per year of paraxylene, orthoxylene, and other aromatics will go on stream first half of 1962.

ETHYLENE PLASTIQUE, 50 Rue la Boetie, Paris 8.
Plant: Mazingarbe.
Product: High-pressure polyethylene (22,000,000 lb. per year).

ETHYLENE PLASTIQUE NORMANDIE, 50 Rue la Boetie, Paris 8.
Plant: Lillebonne.
Product: High-pressure polyethylene (55,000,000 lb. per year).
• Construction: Capacity is being expanded to 100,000,000 lb. per year, with completion fourth quarter 1961.
Plant site: Lacq.
• Construction: Scheduled for completion first quarter 1962 are facilities for 33,000,000 lb. per year of high-pressure polyethylene.

ETHYL-SYNTHESE, affiliated with Ethylene Plastique, 50 Rue la Boetie, Paris 8.
Plant: Mazingarbe.
Product: Styrene monomer (44,000,000 lb. per year).
• Construction: New plant will produce about 30,000 tons per year of styrene using process developed by Koppers. Ste. Belge de l'Azote et des Produits Chimiques du Marly has contract.
Plant site: Lillebonne.
• Construction: Scheduled for completion second quarter 1962 are facilities to produce 66,000,000 lb. per year of styrene monomer from ethylene and benzene.

FIRESTONE FRANCE, S.A., 50 Avenue des Champs-Elysees, Paris.
Plant site: Port Jerome.
• Construction: New plant with 10,000 tons capacity for polybutadiene will be completed late 1961 or early 1962. New facilities will also produce styrene-butadiene specialty copolymer latices, with capacity of 4,000 tons.

FRANCOLOR (Cie. Francaise de Matieres Colorantes), 9 Avenue George V, Paris 8.
Plant site: Villers-St. Paul.
• Construction: A plant to make phthalic anhydride from orthoxylene, readily convertible to naphthalene. Licensed by Scientific Design Co.

KUHLMANN (Etablissements Kuhlmann, S.A.), 25 Boulevard de l'Amiral Bruix, Paris 16.
Plant: Paimboeuf.
Raw material: Natural gas from Lacq field.
Product: Ammonia, sulfuric acid, ammonium sulfate, and sulfumic acid.

LORRAINE-KUHLMANN (Ste. Lorraine-Kuhlmann). 25 bis Boulevard de l'Amiral Bruix, Paris 16.
Plant: Dieuze.
Products: Polystyrol, ABS copolymers.

MANOLENE (Manufacture Normande de Polyethylene), 21 Rue Jean Goujon, Paris 8.
Plant: Gonfreville.
Raw material: Ethylene.
Products: Low-pressure polyethylene (13,000,000 lb. per year).

MARLES-KUHLMANN (Ste. de Produits Chimiques Marles-Kuhlmann), 25 Boulevard de l'Amiral Bruix, Paris 16.
Plant: Chocques.
Raw material: Propylene.
Products: Propylene oxide, propylene derivatives, ethylene oxide, ammonia, sulfuric acid, and ammonium sulfate.
Plant: Gonfreville.
Raw material: Ethylene.
Products: Ethylene oxide and glycol.

METHANOLACQ, 25 Boulevard de l'Amiral Bruix, Paris 16.
Plant: Lacq.
Raw material: Residual natural gas from acetylene plant.
Product: Methanol (100 tons per day).

NAPHTHACHIMIE, S.A., 203 Rue du Faubourg Saint Honore, Paris 8.
Plant: Lavera.
Raw materials: Naphtha and kerosine.
Products: Ethylene (79,000,000 lb. per year), propylene (88,000,000 lb.), butadiene (7,900,000 lb.), ethylene oxide (63,300,000 lb.), glycol (33,400,000 lb.), ethanolamines (10,600,000 lb.), glycol ethers and polyglycol (8,500,000 lb.), isopropanol (28,600,000 lb.), Ziegler polyethylene (5,540,000 lb.), propylene oxide (7,800,000 lb.), propylene glycols (7,200,000 lb.), and polybutene (1,725,000 lb. per year).

NOBEL-BOZEL, S.A., 67 Boulevard Haussman, Paris 8.
Plant: Port Jerome.
Raw material: Refinery gas.
Product: Sulfur (60 tons per day).

ONIA (Office National Industriel de l'Azote), 38 Avenue Hoche, Paris 8.
Plant: Toulouse.
Raw material: Heavy fuel oils.
Products: Acetylene, ammonia, and methanol.

OROGIL (Ste. Orogil, S.A., owned by California Chemical Co. and Progil Electrochimie), 79 Rue de Miromesnil, Paris 8.
Plant: Gonfreville (near Le Havre).
Raw material: Petroleum-base stocks.
Products: Lubricant additives and alkylphenols.

PEC (Potasse et Engrais Chimiques), 10 Avenue George V, Paris 8.
Plant: Grand-Couronne.
Products: Ammonia (100 metric tons per day), nitric acid, and ammonia nitrate complex fertilizers (800 to 900 metric tons per day).

PECHINEY (Cie. de Produits Chimiques et Electro-Metallurgiques, 23 Rue Balzac, Paris 8. See listing for Naphthachemie, a subsidiary.)

PETROSYNTHESE (Ste. Petrosynthese, owned by Alantique - Progil - Electrochimie, California Chemical Co., and Cie. Francaise de Raffinage), 79 Rue de Miromesnil, Paris 8.
Plant: Gonfreville l'Orcher (near Le Havre).
Raw material: Propylene and benzene.
Product. Dodecylbenzene.

PIERREFITTE (Ste. Generale d'Engrais et Produits Chimiques), 4 Avenue Velasquez, Paris 8.
Plant: Soulom (Hautes Pyrenees).
Raw material: Natural gas.
Products: Ammonia (240 metric tons per day) and derivatives, including ammonium nitrate, urea, ammonium phosphate calcium, magnesia nitrate, and others.

PLASTICHIMIE, S.A. (Pechiney and Dow Chemical International), 23 Rue Balzac, Paris 8.
Plant site: Ribecourt (near Paris).
• Construction: New polystyrene and vinylidene chloride copolymer plant set for completion in 1961.

POLYMER CORP., S.A.F. (formed by Polymer Corp., Ltd., Vidal St. S, Sarnia, Ontario, and Banque de Paris et des Pays-Bas, Paris).
Plant site: La Wantzenau (near Strasbourg).
• Construction: A $12-million specialty rubber plant with capacity of 10,000 tons.

PROGIL - ELECTROCHIMIE (Ste. Progil-Electrochimie), 77 Rue de Miromesnil, Paris 8.
Plant: Pont-de-Claix (Isere).
Raw material. Propylene.
Products: Perchlorethylene and carbon tetrachloride.
Raw material: Cumene.
Products: Acetone and phenol.

REICHHOLD BECKACITE, S.A., affiliate of Reichhold Chemicals, Inc., 119-151

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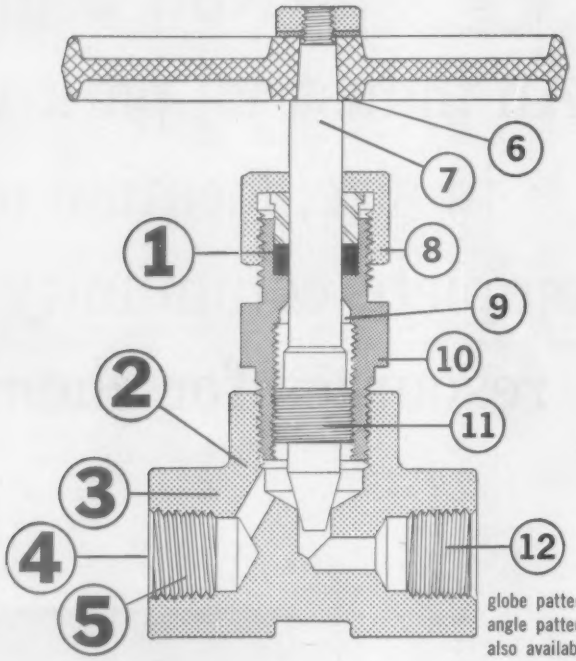

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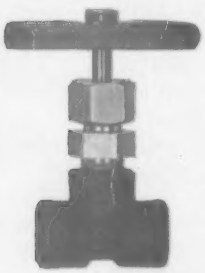

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THE FLATLANDS OF HOLLAND are sprouting new towers as the petrochemical industry continues to expand. About a dozen new projects are in the works in that country. Nederlandsche Dow Maatschappij makes styrene-butadiene latex at the Rotterdam plant shown in the background of this photo.

Route de Carrieres, Bezons (S et O).
Plants: Niort (Deux-Sevres), and Bezons (S et O).
Product: Phthalic anhydride (5,000 tons per year).
• Construction: A new plant in Niort with capacity of 10,500,000 lb. per year of maleic anhydride. Scientific Design Co. has design contract.

RHODIACETA (Ste. Rhodiaceta, subsidiary of Rhone-Poulenc), 27 Rue Jean Goujon, Paris 8.
Plant: Lyon.
Raw material: Natural gas from Lacq field.
Product: One of the largest hydrogen plants in Europe, with capacity of 2,500 M.c.f. per day of hydrogen gas. Product to be used at company's nylon plant.
Plant: St. Fons.
Raw material: Ethylene glycol and para-xylenes.
Products: Terephthalates.

RHONE-POULENC (Ste. des Usines Chimiques Rhone-Poulenc), 21 Rue Jean Goujon, Paris 8.
Plant: Le Peage de Roussillon.
Raw material: Propylene, benzene, and cumene.
Products: Cumene, acetone, and phenol.
Plant: Chalampe.
Product: Adipic acid.

SAINT GOBAIN (Cie. de Saint Gobain), 62 Boulevard Victor Hugo, Neuilly-sur-Seine, France.
Plant: Balaruc.
Product: Sulfur from refinery gas.
Plant: Port de Bouc.
Product: Sulfur from refinery gas.
Plant: Chauny.
Product: Phthalic anhydride.

SES (Ste. des Elastomeres de Synthese, owned by Shell-Saint Gobain, Texas Butadiene & Chemical International. Ltd., and by several tire-manufacturing companies), 27 Rue de Berri, Paris 8.
Plant: Berre (near Marseille).
Product: SBR (50,000 metric tons per year).
• Construction: A butadiene plant with capacity of 35,000 metric tons will be completed late 1963. In design stage is a polybutadiene plant with 25,000 tons per year capacity, to be completed in 1963.

SHELL-SAINT GOBAIN, S.A., 29 Rue de Berri, Paris 8.
Plant: Berre.
Raw material: Propylene, butylene, and heavy cracked residuals.
Products: Isopropanol, diacetone, alcohol, butyl acetone, epoxy resins, carbon black, base materials for detergents, secondary butanol, methyl ethyl ketone, insecticides, and lubricant additives.
Plant: Petit Couronne.
Raw material: C_5-plus kerosine.
Product: Alkyl sulfate of soda for use in detergents.

SIDA (Ste. Industrielle des Derives de l'Acetylene), 16 Rue de Monceau, Paris 8.
Plant: La Chambre.
Raw material: Isopropanol and secondary butanol.
Products: Diacetone alcohol, acetone, and methyl ethyl ketone.
Plant: Notre-Dame de Gravenchon.
Product: Butanol.

SNPA (Ste. Nationale des Petroles d'Aquitaine), 16 Cours Albert Premier, Paris 8.
Plant: Lacq.
Raw material: Natural gas.
Products: Ethylene (25,000 metric tons per year), sulfur (4,000 tons per day), methyl mercaptan, and methane (4,000,000 cubic meters). The plant also produces propane, butane, and natural gasoline.
• Construction: New unit to produce 70,000 metric tons per year of benzene, using hydrodealkylation process.

SOCABU (Ste. du Caoutchouc Butyl), 8 Rue Bellini, Paris 16.
Plant: Port Jerome.
Raw material: Isobutane.
Products: Butyl rubber (20,000 tons per year).

STE CHIMIQUE DE LA GRANDE PAROISSE, 8 Rue Cognacq-Jay, Paris 7.
Plant: Grand Quevilly.
Raw material: Refinery gas.
Product: Ammonia.

STE. INDUSTRIELLE D'ETHANOL DE SYNTHESE.

Plant: Lacq.
Product: Ethanol.

STE. NORMANDIE DE MATIERES PLASTIQUES, affiliated with Ethylene Plastique, 50 Rue la Boetie, Paris 8.
Plant: Lillebonne.
Product: Ziegler-type polyethylene (12,000,000 lb. per year).
• Construction: Facilities for production of polypropylene, involving Montecatini license. This includes capacity for 12,000,000 lb. per year now under construction, with completion scheduled second quarter 1962. In the planning stage are facilities to double this capacity.

STANDARD-KUHLMANN (Ste. Standard Kuhlmann), 82 Champs-Elysees, Paris 8.
Plant: L'Estaque.
Product: Paraflow.

UGILOR (Ste. Ugilor), 16 Rue de Monceau, Paris 8.
• Construction: This company has agreement with Distillers Co. for patents for making acrylonitrile from propylene and ammonia.

UGINE (Ste. d'Electrochimie d'Electrometallurgie et des Acieres Electriques d'Ugine), 10 Rue du General Foy, Paris 8.
Plant: Villers St. Sepulchre.
Raw material: Butadiene and styrene.
Product: Latex rubber.

UNITED CARBON FRANCE, S.A., 7 Avenue George V, Paris 8.
Plant: Port Jerome.
Raw material: Fuel oil.
Product: Carbon black (50,000,000 lb. per year).

VINYLACQ (Ste. Vinylacq, owned by Pechiney, Saint Gobain and Banque de Paris et des Pays-Bas), 23 Rue Balzac, Paris 8.
Plant: Lacq.
Raw material: Acetylene.
Product: Vinyl chloride.

GERMANY (WEST)

BADISCHE ANILIN & SODA-FABRIK, A.G., Post Box 5816, Ludwigshafen a/Rhein.
Plant: Ludwigshafen.
Raw material: Crude oil (100,000 metric tons per year).
Products: Styrene, polyethylene, ethylene oxide, and propionic acid.

BP BENZIN UND PETROLEUM, A.G., Steinstrasse 5, Hamburg 1.
Plant: Dinslaken.
Raw material: From new refinery.
Product: Sulfur.
• Construction: Aromatics facilities are planned at the refinery.

BUNAWERKE HUELS, G.M.B.H., Marl, Kreis Recklinghausen.
Plant: Marl.
Products: Butadiene, styrene, copolymer, and synthetic rubber. (Capacity expanded to 120,000 tons per year.)

CALIFORNIA CHEMICAL CO., subsidiary of Standard Oil Co. of California. (For details see Deutsche BP listing.)

CARBOSULF CHEMISCHE WERKE, G.M.B.H., (joint subsidiary of Glanzstoff Courtaulds, G.m.b.H., and Dr. Jacob, Chemische Fabrik, G.m.b.H., Bad Kreuznach), Neusser Landstrasse 2, Cologne-Weidenpesch.
Plant site: Cologne-Weidenpesch.
• Construction: Scheduled for completion by the beginning of 1962 is a carbon disulfide plant with capacity of 51,800 tons per year. Raw materials will come from refineries in the Cologne area.

CHEMISCHE WERKE HOLTEN, Oberhausen-Holten.
Plant: Oberhausen.
Products: Ethylene oxide and glycol. Capacity estimated at 44,000,000 lb. per year.

CHEMISCHE WERKE HUELS, A.G., Marl, Kreis Recklinghausen.
Plant: Marl.
Raw material: Natural gas, LPG, and coal gas.
Products: Propylene, ethylene, low-pressure polyethylene (6,000 metirc tons per year), ethanol, styrene (84,000 metric tons per year), polystyrene, ethylene oxide. cumene, polyvinyl chloride (50,000 tons per year), dodecylbenzene, and phthalic anhydride (7,000 metric tons per year).

CONDEA PETROCHEMIE, G.M.B.H. (owned by Continental Oil Co. and Deutsche Erdol, A.G.), Brunsbuttelkoog.
Plant site: Brunsbuttelkoog.
• Construction: Scheduled for completion in mid-1963 is a new plant with capacity of 50,000 tons of industrial alcohols. Ethylene raw material will come from the German company's refinery at Heide.

DEUTSCHE BP UND CALIFORNIA, joint venture of British Petroleum Co., Ltd., and California Chemical Co., the latter being a subsidiary of Standard Oil Co. of California, 200 Bush St., San Francisco, Calif.
Plant site: Dinslaken.
• Construction: Completion of a new paraxylene plant here is scheduled for mid-1962. The German firm Lurgi has contract for the plant, which will have capacity of 14,000 metric tons per year. Benzene feed stock will come from nearby BP refinery. This project is part of a $19.6-million venture for two aromatics plants. The other will be at Kent, England.

DEUTSCHE ERDOL - AKTIENGESELLSCHAFT, Erdolwerke Holstein, Postschliessfach 44, Heide-Holstein.
Plant: Heide.
Products: Ethylene (2,000,000 lb. per year), propylene (18,000,000 lb.), sulfur (5,300,000 lb.), and isobutylene (11,000,000 lb. per year).

DEUTSCHE SHELL, A.G., Shellhause Alsterufer 45, Hamburg 36.
Plant: Near Cologne.
Raw material. Refinery gases.
Product: Ethylene, used at adjacent plant of Reinische Olefinwerke.

ERDOLCHEMIE, G.M.B.H. (owned by Farbenfabriken Bayer, A.G., and BP Benzin und Petroleum, A.G.), Dormagen (Niederrhein) 1.
Plant: Dormagen (near Cologne).
Raw material: Refinery feed stocks.
Products: Ethylene (45,000 tons per year), ethylene oxide (36,000 tons), ethylene glycol (32,00 tons), ethanol (18,000 tons), propylene (40,000 tons), propylene oxide (15,000 tons), and butadiene (30,000 tons per year).
• Construction: Scheduled for completion in 1961 are facilities for production of diisobutylene and triisobutylene (together 45,000 tons per year), and a mixture of n-butylene (35,000 tons per year).

ESSO, A.G., Neuer Jungfernstieg 21, Hamburg 36.
Plant: Cologne.
Raw material: Refinery feed stocks.
Products: Ethylene (45,000 tons per year), propylene (35,000 tons), butadiene (7,500 tons), and butylenes.
• Construction: A $13-million petrochemical expansion program at Esso's 72,000-bbl. per day Cologne refinery will double yield that can be used as petrochemical feed stocks. Completion fall 1961.
Plant: Hamburg-Harburg.
Raw material: Refinery gas.
Products: Butylenes and propylene.

FARBENFABRIKEN BAYER, A.G., Leverkusen.
Plants: Leverkusen and Dormagen.
Products: Synthetic rubber, ABS plastic, binder materials, detergents and emulsifiers, polyethers, polyesters, and diisopropylbenzene.
• Construction: Facilities for aliphatic polymers, polybutadiene, polyisoprene, and synthetic fibers.

FARBWERKE HOECHST, A.G., Hoechst, Frankfurt am Main.
Plant: Gendorf.
Raw material: Refinery feed stocks and natural gas.
Products: Ethylene oxide and glycol, other glycols and derivatives, detergents, nylon, emulsifiers, lacquers, antifreeze compounds, textile and agricultural chemicals, polyvinyl chloride, polypropylene and other plastics, and methane chlorination products.
Plant: Hoechst.
Raw material: Petroleum distillates.
Products: Ethylene, propylene, polypropylene, ethanol, isopropanol, acetone, low-pressure polyethylene, polyvinyl acetate, and fibers and films.
Plant: Hamburg-Harburg.
Raw material: Refinery gas.
Products: Butadiene and propylene.
Plant site: Near Frankfurt.
• Construction: Negotiating to buy land near Frankfurt. Petrochemical output would be increased, using LPG from Caltex refinery.

FASERWERKE HUELS, joint subsidiary of Tennessee Eastman Co., Kingsport, Tenn., and Chemische Werke Huels, A.G., Marl, Kreis Recklinghausen, Germany.
Plant site: Marl.
• Construction: To build a polyester fiber plant.

GELSENBERG BENZIN, A.G., Postfach 15, Gelsenkirchen-Horst.
Plant site: Gelsenkirchen-Horst.
• Construction: A new benzene plant is

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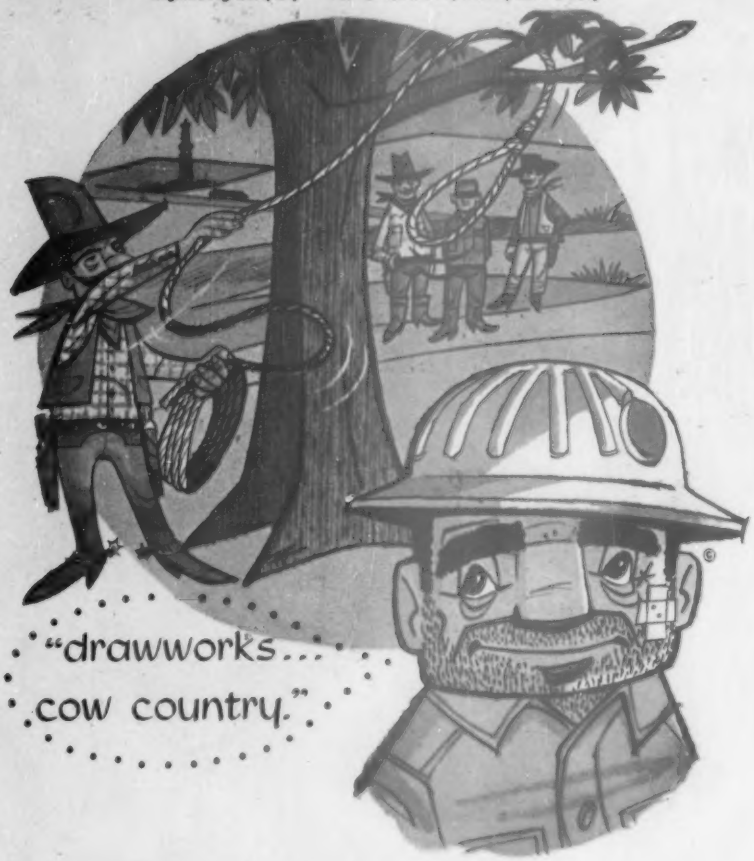

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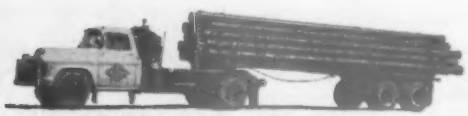

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PETROCHEMICAL-PLANT SURVEY

under way at this refinery. Lurgi is doing the construction. Completion scheduled fall 1961, with production of 23,000 to 47,000 tons per year.

HIBERNIA, Dechenstrasse 3, Gladbeck.
Plant: Herne.
Products: Ethylene and polypropylene.

KOHLE - OEL - CHEMIE, A.G., Uechtingstrasse 134, Gelsenkirchen.
Product: Polyethylene.

PHENOLCHEMIE, G.M.B.H., owned by Hibernia, Dechenstrasse 3, Gladbeck.
Plant: Gladbeck.
Products: Phenol and acetone.

POLYCARBONA CHEMIE, G.M.B.H., formed by Rheinpreussen, A.G., Baumstrasse 31, Homberg (Niederrhein).
• Construction: New facilities to produce phthalic anhydride, maleic anhydride, and plasticizers.

REICHHOLD CHEMIE (owned by Reichhold and Deutche Erdol), Iversstrasse 57, Hamburg-Wandsbeck.
Plant: At North Sea port of Brunsbuettelkoog.
Products: Interim products.

RHEINSCHE OLEFINWERKE, G.M.B.H. (owned by Shell and Badische Anilin & Soda-Fabrik), Postfach 31, Wesseling, bez. Cologne.
Plant: Wesseling near Cologne.
Raw material: Refinery gases and light naphthas.
Products: Ethyl benzene (24,000 tons per year), epoxy resins (3,200 tons), ethylene (125,000 tons per year), high-pressure polyethylene (100,000 tons), and low-pressure polyethylene (12,000 tons per year).
• Construction: Expanding ethylene capacity to an estimated 255,000,000 lb. per year and polyethylene capacity correspondingly, with completion third quarter 1961.

RHEINPREUSSEN, A.G., Baumstrasse 31, Homberg (Niederrhein).
Plant: Homberg and Meerbeck bei Moers (Niederrhein).
Products: Dodecylbenzene, ethanol, acetone, butyl alcohols, isopropanol, alky phenols, diisobutylene, oxo-alcohols, methyl isopropyl ketone, phthalic anhydride, triisobutylene, methyl ethyl ketone, ethyl amyl ketone, and plastics.
• Construction: Building a 13,200,000-lb. per year maleic anhydride plant, using Scientific Design Co. fixed-bed catalytic, air oxidation of benzene.

ROHM & HAAS, G.M.B.H., Mainzer Strasse 42, Darmstadt.
Plant: Darmstadt.
Product: Acrylic and methyl-acrylic resins.

RUHRCHEMIE, A.G., Bruchstrasse, Oberhausen-Holten.
Plant: Oberhausen-Holten.
Products: Nitrogen fertilizer, oxo synthesis, polyethylene, and catalysts.

UNION RHEINISCHE BRAUNKOHLEN KRAFTSTOFF, A.G., Postschliessfach 8, Wesseling, bez. Cologne.
Plant: Wesseling (near Cologne).
Raw material: Refinery feed stocks and Rhine coal.
Products: Ammonia, methanol, and 25,000 tons per year of urea.

PETROCHEMICAL-PLANT SURVEY

WACKER CHEMIE, G.M.B.H., Prinzregentstrasse 22, Munich.
Plant: Burghausen.
Products: Trichloroethylene and vinyl acetate.

GREECE

DOW HELLENIC CHEMICAL INDUSTRY, LTD. (Dow Chemical Co., Midland, Mich.), Lavrion, Athens.
Plant site: Lavrion, near Athens.
- Construction: Scheduled for completion in November 1961 is a new polystyrene plant, costing more than $1 million. It will use imported petroleum raw materials, and will be the first such plant for this country. Foster Wheeler Italiana has construction contract.

INDIA

ALKALI & CHEMICAL CORP. (subsidiary of Imperial Chemical Industries).
Plant: West Bengal.
Product: Polyethylene (3,500 tons per year).

DUNCAN BROS. & CO., LTD., 25 Netaji Subhash Road, Calcutta.
Plant site: Near Nahorkatiya, State of Assam.
- Construction: This proposal calls for a synthetic rubber plant to manufacture 20,000 tons of Cis-4 polybutadiene, with technical assistance from Phillips Petroleum Co.

FERTILISER CORP. OF INDIA, 157/58 Diplomatic Enclave, New Delhi.
Plant site: Alwaye, State of Kerala.
- Construction: Long-range proposal calls for fertilizer plant using naphtha as feed stock. Capacity would be 65,000 long tons per year of N_2.

Plant site: Ankleshwar, State of Gujarat.
- Construction: Long-range proposal calls for fertilizer plant, using naphtha gas. Capacity would be 90,000 long tons per year of N_2.

Plant site: Gaorkhpur, State of Uttar Pradesh.
- Construction: Long-range proposal calls for fertilizer plant, using naphtha as raw material. Capacity would be 80,000 long tons per year of N_2.

Plant site: Namrup (near Nahorkatiya), State of Assam.
- Construction: Project for a fertilizer plant has been approved and construction expected to start soon. The plant will produce 50,000 long tons per year of urea and 50,000 long tons per year of ammonium phosphate, using 7.2 M.c.f.d. of gas from Nahorkatiya field. Foreign exchange for the project has been provided by British Government in sterling.

Plant site: Trombay, State of Maharashtra.
- Construction: Project approved and construction to start soon. Capacity will be 90,000 long tons per year of N_2. Chemical Construction Co., U. S. firm, has contract for machinery and equipment, which will be paid for from a loan by the U. S. Developmtnt Loan Fund. Burmah-Shell refinery at Trombay will supply 50,000 tons of refinery gas per year. This will be the first fertilizer plant in India to use refinery gas as raw product. Production scheduled to start by end of 1963.

INDIAN GOVERNMENT
Plant sites: In conjunction with new state-owned refineries at Nunmati in

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State of Assam, and Barauni in State of Bihar.

• Construction: In addition to license granted one company (see Synthetics Plastics Co., Ltd., listing), the Ministry of Oil is carrying out preliminary investigations for other petrochemical projects involving these two refineries.

Plant site: Cambay region of Gujarat.

• Construction: The Oil and Natural Gas Commission is examining feasibility of petrochemicals in this region, based on oil and gas field production.

(In addition to all Indian projects mentioned in this survey, fertilizer plants have been suggested for the private section in Hanumangarh, State of Rajasthan, using gas and/or naphtha; Katni or Itarsi in the State of Madhaya Pradesh, using coal and/or naphtha; and at Ennore/Tuticorin, State of Madras, using naphtha.)

NATIONAL CARBON INDIA
Plant: Near Bombay.
Product: Polyethylene.

PARRY & CO., Dare House, First Line Beach, Madras 1.
Plant site: Visakhapatnam, State of Andhra.

• Construction: Approved and scheduled to begin construction soon is a fertilizer plant with capacity of 80,000 long tons per year of N_2. Raw material will be refinery gas from Caltex plant. This project is in collaboration with International Minerals & Chemicals Corp. and California Chemical Co. Production scheduled by end of 1963.

PJB INDUSTRIES, 25 Netaji Subhash Road, Calcutta.
Plant site: Near Nahorkatiya, State of Assam.

• Construction: This proposal calls for plant to manufacture 10,000 tons of semi-reinforced furnace black and high-medulus furnace black per year, using 5 M.c.f.d. of gas. Technical assistance would come from Continental Carbon Co., Houston. Completion expected end of 1962 or early 1963.

R. A. COLE & CO. PRIVATE, LTD., Bombay, and **BADISCHE ANILIN UND SODA-FABRIK,** West Germany.
Plant site: Thana, 25 miles north of Bombay.

• Construction: These two companies have entered into a 50-50 partnership to manufacture polystyrene, based on raw materials imported from western Europe.

STANDARD-VACUUM OIL CO.
Plant site: Trombay, Maharashtra.

• Construction: The Indian Government has granted license to Standard-Vacuum to make petrochemicals from naphtha at the Trombay refinery. Products to include ethylene, propylene, butylene, butadiene, benzene, and others. Capacity will be about 100,000 tons.

SYNTHETICS & CHEMICALS, LTD., (formed by Kilachand Devchand & Co. Private, Ltd., Bombay, and Firestone Tyre & Rubber Co.).
Plant site: Bareilly, State of Uttar Pradesh.

• Construction: Contract awarded to Lummus Co. for a $30-million synthetic rubber plant, the first for India. Basic raw material for the manufacture of 20,000 tons of styrene, butadiene, and copolymer per year will be alcohol from molasses. But some petrochemicals will also be used in styrene manufacture.

SYNTHETICS PLASTIC CO., LTD., Calcutta.
Plant site: Near Gauhati, State of Assam.

• Construction: License has been granted to this company to build a polyethylene plant with annual capacity of 4,000 tons, using waste gas from Nunmati refinery. (For more detail on long-range projects near new state-owned refinery at Nunmati and at Barauni, see listing for INDIAN GOVERNMENT.)

UNION CARBIDE INDIA, LTD.
Plant: Trombay.
Raw material: Refinery gas and naphtha.
Products: Polyethylene (8,500,000 lb. per year), ethylene dichloride (3,000,000 lb.), and other chemicals (6,000,000 lb. per year).

• Construction: The Indian Government has granted license for increased capacity as follows: 25,000,000 lb. per year of polyethylene, 6,500,000 lb. of butyl alcohol, 6,000,000 lb. of butyl acetate, 1,500,000 lb. of ethyl acetate, 3,000,000 lb. of acetic acid, and 10,000,000 lb. of benzene.

INDONESIA

INDONESIAN GOVERNMENT.
Plant site: Near Palembang, Sumatra.

• Construction: Planned here is a $30-million ammonia plant, with capacity of 330 tons per day of fertilizer-grade prilled urea. Raw material would be natural gas from Radja field.

IRAN

IRANIAN GOVERNMENT.
Plant: Shiraz.
Raw material: Natural gas.
Product: Nitrogen fertilizer (110 tons per day).

MONTECATINI, Largo Donegani 1-2, Milan, Italy.
Plant: Ahwaz.
Raw material: Natural gas from Agha Jari.
Product: Polyvinyl chloride (4,000 tons per year).

IRAQ

IRAQ GOVERNMENT.
Plant: Basrah area.
Raw material: Natural gas.
Product: Fertilizer.
Plant site: Dibis, near Kirkuk.

• Construction: Sulfur-recovery plant, capable of producing 65,000 tons of sulfur and 110,000 tons of sulfuric acid per year. The project involves an agreement with USSR.

ISRAEL

ISRAELI PETROCHEMICALS INDUSTRIES, LTD. (owned one-third by Haifa Refineries & Paz, Ltd.; one-third by a South American group; and one-third by a U. S. group).
Plant site: Near Haifa refinery.

• Construction: Facilities would involve capacity for 1,500 tons per year of ethylene, 6,000 tons of polyethylene, 20,000 lb. of carbon black, and 6,000 tons per year of feed stocks for detergents.

ITALY

ABCD (Asfalti Bitumi Cementic Derivati, S.A.), Via M. Stabile 216, Palermo.
Plant: Ragusa, Sicily.
Raw material: Crude from nearby wells.
Products: Ethylene, high-pressure polyethylene (25 tons per day), propylene, butylene, and derivatives.

ACNA (Aziende Colori Nazionale Affini, Gruppo Montecatini), Largo Donegani 1-2, Milan.
Plant: Cengio (Savona).
Raw material: Hot pressed naphthalene.
Product: Phthalic anhydride (10,000 tons per year).

ACSA (Applicazione Chimiche Societa Azioni), Principe Eugenio 5, Milan.
Plant: Milan.
Product: Synthetic fibers.

ANIC (Azienda Nazionale Idrogenazione Combustible, affiliated with ENI), San Donato Milanese, Milan.
Plant: Ravenna.
Raw material: Methane and refinery butane.
Products: Ammonia, nitrogen fertilizer (750,000 tons per year), acetylene, butadiene for synthetic rubber (80,000 tons per year), styrene monomer, and ethylene.

AUGUSTA PETROLCHIMICA, an associated company with Montecatini, Largo Donegani 1-2, Milan.
Plant: Priolo, Sicily.
Raw material: From refinery at Augusta.
Product: Ammonia (33,000 tons per year).

BOMBRINI PARADI-DELFINO. Via del Corso 267, Rome.
Plant site: Colleferro.

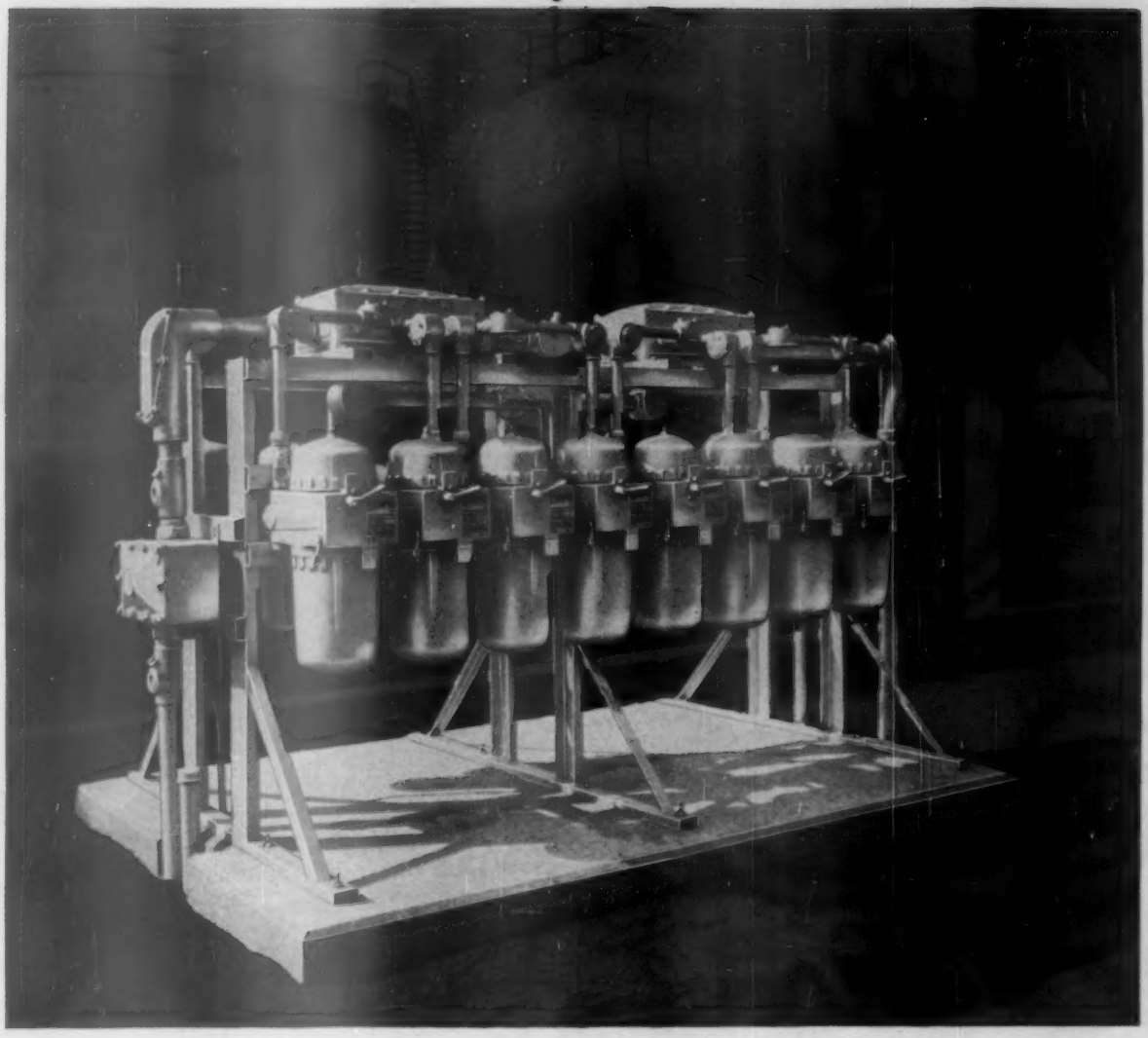
• Construction: Due on stream mid-1962 are facilities for 10,000,000 lb. per year of maleic anhydride, using Scientific Design's air-oxidation process of benzene.

CABOT ITALIANA, S.P.A. (subsidiary of Cabot Corp., Boston, Mass.), Sinistra Canale Canadiano, Ravenna.
Plant: Ravenna.
Product: Carbon black (30,000,000 lb. per year).

CELENE (S.p.A. Celene, owned jointly by Union Carbide and Soc. Edison), Corso Italia 13, Milan.
Plant: Near Priolo, Sicily.
Products: Polyethylene (32,500 tons per year), propylene oxide (12,500 tons per year), and ethylene oxide and derivatives.

COLUMBIAN CONTINENTAL EUROPA, Piazza Diaz 7, Milan.
Plant: S. Martino di Trecate (Novara).
Product: Carbon black, (60,000,000 lb. per year).

DISTILLERIE ITALIENNE.
Plant: Milan.
Product: Butanol (11,000 tons per year).



Match the specs for your Motor Control Center with

CROUSE-HINDS Standardized Rack Modules

Crouse-Hinds rack modules for motor control centers may be assembled to accommodate any combination of Crouse-Hinds motor starters, circuit breakers and accessory equipment. They may be specified to conform to any of the following requirements under the National Electrical Code:

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DOW CHIMICA ITALIANA, S.P.A., Via Larga 31, Milan.
Plant site: Near Leghorn.
- Construction: Facilities under way for production of polystyrene, with Foster Wheeler Italiana as contractor. Completion scheduled for 1962. Capacity eventually will be about 16,000 tons per year.

ENI (Ente Nazionale Idrocarburi), Via Tevere 50, Rome.
Plant site: Gela, Sicily.
- Construction: Under way now and scheduled for completion in 1962 or 1963 are facilities to produce chemical products, plastics, fertilizers, and solvents, using oil as raw material.

Plant site: Pisticci, South Italy.
- Construction: Now in the planning stage are facilities for production of plastics and synthetic fibers, using natural gas as raw material. Completion is scheduled in 1963 or 1964.

FTALITAL, S.P.A., Via Cimarosa 12/5, Milan.
Plant site: Scanzorosciate (near Bergamo).
Raw material: Orthoxylene.
Products: Maleic anhydride (4,500 tons per year), phthalic anhydride (35,000 tons per year), and furamic acid (2,000 tons per year).

MOBIL CHIMICA ITALIANA, S.P.A., affiliated with Socony Mobil Oil Co., Inc., 150 E. 42 St., New York 17.
Plant site: Naples.
- Construction: To build a new plant for production of 130,000 metric tons per year of benzene, ethylbenzene, orthoxylene, and paraxylene. More than 75% of the production will be benzene and orthoxylene. Raw materials will come mainly from the Mobil Oil Italiana refinery.

MONTECATINI (Soc. Generale per l'Industria Minerarin e Chimica), Largo Donegani 1-2, Milan.
Plant site: Brindisi.
- Construction: Scheduled for completion early 1962 is a $95-million petrochemical complex with capacity of 1,500,000 tons of raw material annually. Production will include olefins from petroleum, acetylene from hydrocarbons, polyethylene, isotactic polypropylene, polybutenes, polymers for synthetic fibers, methanol, aldehydes, alcohols, glycols, ethylene oxide, solvents, ethylene-propylene copolymers, and others.

Plant: Castellanza.
Product: Formaldehyde (100 tons per year).
Plant: Ferrara.
Raw material: Methane, liquid hydrocarbons, and refinery gases.
Products: Ethylene (30,000 metric tons per year), propylene (15,000 tons per year), polyethylene, isotactic polypropylene (20,000 metric tons), ammonia (90,000 tons per year), urea (70,000 tons per year), and nitrogen fertilizers.
Plant: Novara.
Raw material: Methane.
Products: Ammonia (45,000 tons per year), methyl alcohol (50,000 tons per year), urea (40,000 tons per year), nitrogen fertilizers, and acetylene.
Plant: Priolo, Sicily. (See listing for Augusta Petrolchimica.)
Plant: Terni. (See listing for Polymer, S.p.A.)

PHILLIPS CARBON BLACK ITALIANA, S.P.A. (owned by Phillips Petroleum Co. and ANIC), Casella Postale 188, Ravenna.
Plant: Ravenna.
Product: Carbon black (about 25,000,000 lb. per year of FEF, HAF, and ISAF).

POLYMER, S.P.A., an associated company of Montecatini, Largo Donegani 1-2, Milan.
Plant: Terni.
Product: Polypropylene staple fiber (12,000,000 lb. per year).
- Construction: Major expansion by 1962.

RUMIANCA, S.P.A., Corso Monteveccio 39, Torino.
Plant site: Possibly Pieve Vergonte (near Swiss border).
- Construction: A $3-million polyvinylchloride plant, with capacity of 10,000 metric tons per year, will be completed mid-1962. Engineering by U. S. Rubber.

SHELL ITALIANA, Piazza della Vittoria 1, Genoa, Italy.
Plant site: Pantanedo di Rho.
- Construction: Scheduled for completion October 1961 are facilities for 40,000 tons per year of benzene, toluene, and xylene.

SICEDISON, S.P.A. (affiliate of Soc. Edison), Principe Eugenio 5, Milan.
Plant: Porto Marghera (Venice).
Raw material: Methane.
Products: Acetylene and vinyl derivatives, chlorinated solvents, hydrocyanic acid, and acrylic nitrile.
Plant: Mantura.
Raw material: Liquid hydrocarbons and refinery gases.
Products: Olefins, polystyrene, alkyl benzene, dichloroethane, phenol, and acetone.

SINCAT (Soc. Industriale Catanese, affiliated with Industriale Catonese and Cia. Edison), Corso Sempione 2, Milan.
Plant: Syracuse, Sicily.
Raw material: From refinery at Augusta.
Products: Olefins, especially ethylene and propylene.
Plant: Priolo, Sicily.
Raw material: Ragusa crude.
Products: Ethylene and ammonia (240 metric tons per year).

SIRE (Soc. Italiana Resina), Via Grazioli 33, Milan, Italy.
Plant: Milan.
Raw material: Methane.
Products: Acetylene and acetic derivatives.
Plant: Porto Torres, Sardinia.
Products: Ethylene, propylene, ethanol, and propylene tetramer.
Plant: Varses.
Products: Propylene tetramer and cumene-phenol.

SNIA VISCOSA (Soc. Nazionale Industria Applicazioni Viscosa, S.p.A.), Via Cernaia 8, Milan.
Plant: Near Milan.
Raw material: Natural gas.
Product: Carbon disulfide for manufacture of rayon.

SOC. CHIMICA RAVENNA (associated with ANIC), Via Cimitero, Ravenna.
Plant: Ravenna.
Product: Vinyl chloride.

SOC. EDISON, SETTORE CHIMICO, Principe Eugenio 5, Milan.
Plant: Porto Marghera (Venice).
Raw material: Methane.
Products: Acetylene and acetic derivatives, and ammonia and fertilizers.

SOC. ITALIANA RESINA GUIF (company newly formed by Gulf and SIRE, Via Grazioli 33, Milan).
Plant site: Porto Torres, Sardinia.
- Construction: Scheduled for completion mid-1962 is a new phenol-acetone plant, with capacity of 70,000 metric tons per year. Raw material will be cumene.

VETROCOKE, S.P.A., Casella Postale 306, Porto Marghera.
Plant: Marghera.
Raw material: Methane.
Product: Ammonia.

JAPAN

AKITA PETROCHEMICAL CO., LTD.
Plant: Akita.
Raw material: Natural gas.
Product: Methanol (62,000 tons per year).

ASAHI DENKA KOGYO K.K.
Plant site: Ogu, Tokyo.
- Construction: Planning to produce the following by the end of 1961: propylene oxide (2,400 tons per year), and polypropylene glycol (1,800 tons). Raw material will be propylene.

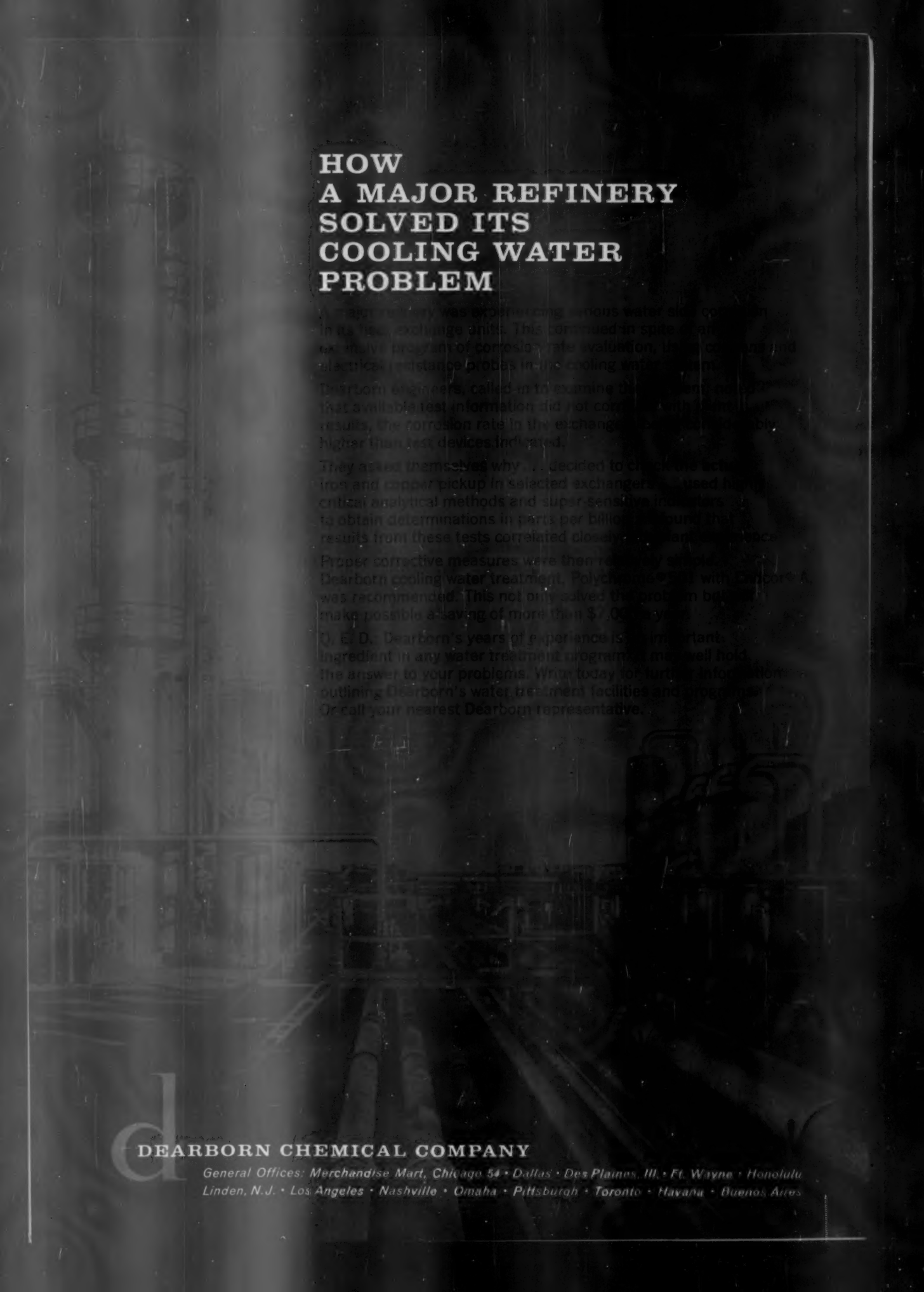
ASAHI-DOW, LTD.
Plant: Kawasaki.
Raw material: Ethylene and benzene.
Products: Styrene monomer (36,000 tons per year), polystyrene (16,800 tons), and styrene copolymer (3,000 tons).
- Construction: Planning to produce the following in 1962: polyethylene (25,000 tons per year), and SBR latex (4,800 tons).

ASAHI GLASS CO., LTD.
Plant: Yodogawa, Osaka Prefecture.
Raw material: Propylene.
Products: Propylene oxide (1,920 tons per year), and propylene glycol (2,400 tons).
Plant site: Goi, Chiba Prefecture.
Raw material: Natural gas.
- Construction: Planning to produce ethylene dichloride.

ASAHI KASEI K.K.
Plant site: Kawasaki.
- Construction: Facilities for acrylonitrile (5,000 tons per year), and polyurethane foam (2,400 tons) to be completed in 1961. Scheduled in 1963 are facilities for polybutadiene and polyisoprene (20,000 tons per year), and set for 1964 are facilities for isoprene monomer (10,000 tons per year).

DAI KYOWA PETROCHEMICAL CO., LTD. (jointly owned by Daikyo Oil and Kyowa Fermentation).
Plant site: Kokkaichi.
- Construction: Planned for 1962 are facilities for butanol (25,000 tons per year), octanol (6,000 tons), acetone (25,600 tons), MIBK (10,000 tons), and MIBC (2,500 tons). Planned for 1963 are facilities for DOP (8,500 tons per year), ethylene (41,300 tons), propylene (20,600 tons), and acetaldehyde (61,500 tons). Raw material will be refinery gas and naphtha.

DAI NIPPON KASEI K.K. (100% subsidiary of Dai Nippon Celluloid Co.).



HOW A MAJOR REFINERY SOLVED ITS COOLING WATER PROBLEM

A major refinery was experiencing serious water side corrosion in its heat exchange units. This continued in spite of extensive programs of corrosion rate evaluation, using coupons and electrical resistance probes in the cooling water system.

Dearborn engineers, called in to examine the treatment program, found that available test information did not correlate with corrosion results. The corrosion rate in the exchangers was considerably higher than test devices indicated.

They asked themselves why . . . decided to check for actual iron and copper pickup in selected exchangers. They used highly critical analytical methods and super-sensitive instruments to obtain determinations in parts per billion. The unique results from these tests correlated closely with [illegible].

Proper corrective measures were then readily selected. Dearborn cooling water treatment, Polychromate 533 with Calgon A, was recommended. This not only solved the problem but made possible a saving of more than $7,000 a year.

Q. E. D. Dearborn's years of experience is an important ingredient in any water treatment program. We can well hold the answer to your problems. Write today for further information outlining Dearborn's water treatment facilities and programs. Or call your nearest Dearborn representative.

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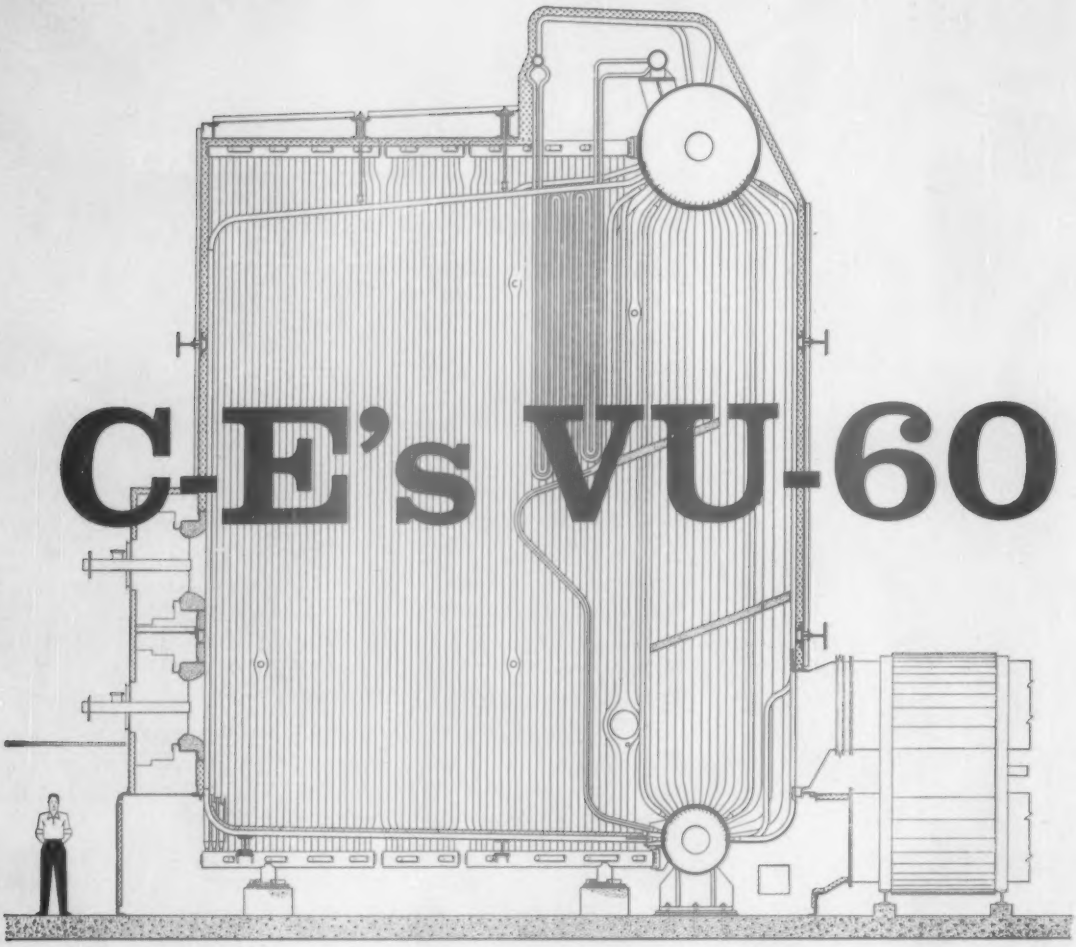
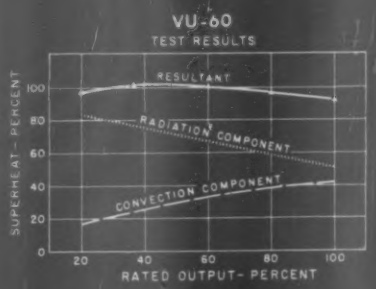
C-E's VU-60



SOME DESIGN HIGHLIGHTS OF THE VU-60



Modular increments allow assembly of custom designs from standardized components; boiler can be proportioned for best combustion, heat absorption, gas flow — even where space conditions are difficult.

Completely self-cased, the VU-60 is an all-welded pressure-tight envelope composed of modular panels of finned tubes; fewer field welds cut erection time.

Insulation and preformed lagging go directly over tube panels, thus reducing non-working weight per pound of steam generated.

Characteristic of Combustion's VU-60. This superheater curve indicates a temperature stability throughout entire load range.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER

GIVES YOU A CUSTOM-DESIGNED BOILER BASED ON STANDARDIZED MODULAR COMPONENTS

Because of its unique modular concept, C-E's new VU-60 offers unusual flexibility and can be designed to meet unusual or difficult space conditions.

VU-60 SPECIFICATIONS

Capacities:	100,000 to 250,000 lb per hr
Design pressures:	250, 500, 750, 1040 psi
Steam temperatures:	to 900F
Fuels:	Oil and/or gas
Firing:	Horizontal (front wall) or tangential
Size increments:	Depth-twelve Width-eight Height-three
Steam drum sizes:	Four

The VU-60 is a completely self-cased boiler. Finned tubes, shop-welded into modular panels, make up the exterior walls of the unit. The fins joining the panels are field-welded to make a pressure-tight envelope. Insulation is applied directly over these walls and is covered by pre-formed, field-installed metal lagging. The need for bulky or heavy nonworking structural members is kept to a minimum.

The VU-60 can be designed to meet your most exacting steam needs. It is easy to install, economical and dependable in operation, completely accessible and functional. Why not get full information on how this new concept can fulfill your specialized requirements?

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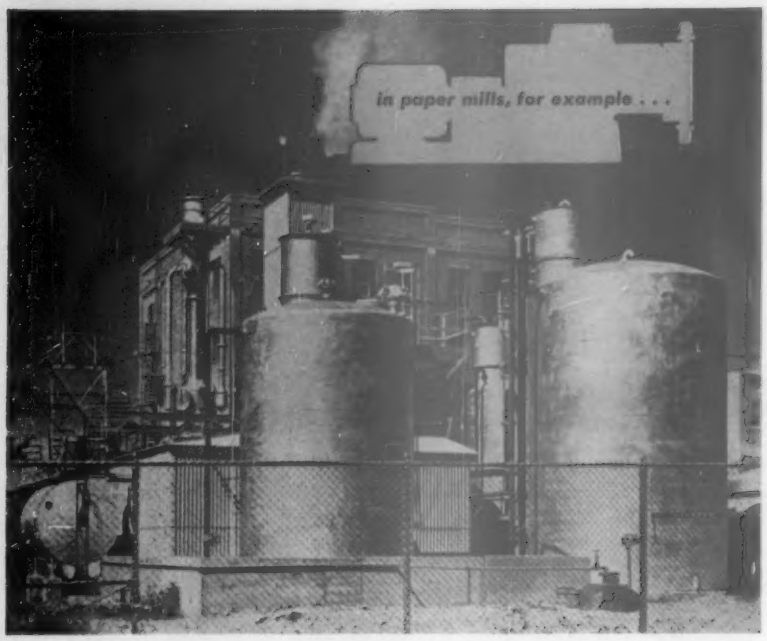


Pulsafeeder compounds chlorine dioxide bleach in perfect proportion without leakage

For Nekoosa-Edwards Paper Company, a special quintuplex Pulsafeeder provides continuous production of a bleaching compound that is too unstable to store. Each of the five heads is independently adjustable to meter out the proper proportion of water, sodium chlorate, sulphuric acid, and two additions of methanol. Result: a critically precise formulation of chlorine dioxide, with total output controlled by a single variable speed drive to keep pace with process rate. Never a drop of leakage . . . never a trace of corrosion . . . in over four years of steady use!

PULSAFEEDER IS THE METERING PUMP THAT:

withstands the hardest-to-handle materials you can feed into it . . .

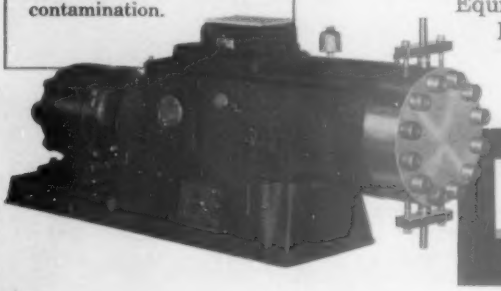
meters them at critically controlled flow rates . . .

never leaks a drop . . .

and completely seals pumping fluids from process materials so there can never be a trace of contamination.

The harder your materials are to handle, and the tighter your tolerances, the more you need a Pulsafeeder. Choose from today's most complete line—in flow rates from a few drops to 15.7 gallons per minute—with reagent heads resistant to any material you use.

WRITE for Catalog 59. Lapp Insulator Co., Inc. Process Equipment Division, 1021 Poplar Street, LeRoy, New York.



Lapp

PETROCHEMICAL-PLANT SURVEY

Plant site: Goi, Chiba Prefecture.
- Construction: Planning to produce the following in 1962: butanol (12,000 tons per year), acetic acid (7,200 tons), methoxybutyl acetate (2,400 tons), and butyl acetate (7,200 tons). Raw material will be acetaldehyde.

DENKI KAGAKU K.K.
Plant site: Goi, Chiba Prefecture.
Raw material: Ethylene and propylene.
- Construction: Chloroprene, vinyl acetate, polyethyl plastics, higher alcohol, propylene glycol, propylene oxide, and other facilities to be built in 1963.

ETHYL KAGAKU K.K. (jointly owned by Toyo Soda, Mitsui Bussan).
Plant site: Tokuyama.
Raw material: Ethylene.
- Construction: Planning to produce tetraethyl lead (10,000 tons per year), and tetramethyl lead (500 tons) in 1962.

FURUKAWA CHEMICAL IND. CO., LTD.
Plant: Kawasaki.
Raw material: Ethylene and butenes-butylenes.
Products: Polyethylene (9,000 tons per year), and polybutene (2,000 tons).
- Construction: Planning to produce 750,000 gal. per year of lubricating-oil additives in 1962.

IDEMITSU KOSAN K.K.
Plant site: Tokuyama.
Raw material: Refinery gas and naphtha.
- Construction: Planning to produce the following in 1962: ethylene (100,000 tons per year), propylene (77,500 tons), butadiene (19,000 tons), benzene (19,000 tons), toluene (14,000 tons), and xylene (12,000 tons).

JAPAN CATALYTIC CHEMICAL IND. CO., LTD.
Plant: Kawasaki.
Raw material: Ethylene.
Products: Ethylene oxide (18,800 tons per year), and ethylene glycol (24,800 tons).
Plant: Suita, Osaka Prefecture.
Raw material: O-xylene.
Product: Phthalic acid anhydride (46,800 tons per year).

JAPAN GAS CHEMICAL CO., LTD.
Plant: Niigata.
Raw material: Natural gas.
Products: Methanol (84,000 tons per year), ammonia (72,000 tons), urea (57,500 tons), ammonia sulfate (144,000 tons), acetic acid (7,200 tons), butanol (3,600 tons), and hydrogen cyanide (3,600 tons).
Plant site: Tokuyama.
Raw material: Ethylene and propylene.
- Construction: Planning to produce the following in 1962: acetaldehyde (59,750 tons per year), acetic acid (26,000 tons), butanol (14,760 tons), octanol (6,000 tons), and vinyl acetate (14,400 tons).

JAPAN GEON CO., LTD. (owned by Furukawa Group and 35% by B. F. Goodrich).
Plant: Kawasaki.
Raw material: Butadiene and styrene monomer.
Products: SBR (2,400 tons per year), NBR (2,400 tons), and high styrene rubber (3,600 tons).
- Construction: Plans call for the above plant capacity to be increased up to 21,600 tons per year of synthetic rubber in 1963.

JAPAN HYDROGEN IND. CO., LTD.
Plant: Onahama, Fukushima Prefecture.
Raw material: Natural gas.
Products: Ammonium sulfate (179,000 tons per year), sulfuric acid (145,000 tons), methanol (16,450 tons), formalin (25,200 tons), paraformaldehyde (3,600 tons), sulfurous acid (5,400 tons), and urotropin (800 tons).

JAPAN SODA CO., LTD.
Plant: Nihongi, Niigata Prefecture.
Raw material: Ethylene and propylene.
Products: Ethylene oxide (3,000 tons per year), polyethylene glycol (840 tons), and polypropylene glycol (600 tons).
Plant site: Goi, Chiba Prefecture.
• Construction: The company is planning to construct a new plant to increase the production of the following in 1963: ethylene oxide (up to 12,000 tons per year), ethylene glycol (up to 7,600 tons), and polyethylene glycol (up to 1,200 tons).

JAPAN SYNTHETIC CHEMICAL CO., LTD.
Plant site: Mizushima.
• Construction: Planning to produce the following in 1962: Acetic acid (30,000 tons per year), ethyl acetate (8,400 tons), butanol (12,000 tons), methoxybutanol (3,600 tons), and others. Raw material will be acetaldehyde.

JAPAN SYNTHETIC RUBBER CO., LTD.
Plant: Yokkaichi.
Raw material: Normal butane and styrene monomer.
Products: Butadiene (33,500 tons per year) and SBR (50,000 tons).
• Construction: Planning to produce 13,000 tons per year of carbon black in 1962.

KANEGAFUCHI BOSEKI K.K.
Plant site: Bofu, Yamaguchi Prefecture.
• Construction: Plans call for vinyl acetate (20,000 tons per year), dodecyl benzene (10,000 tons), para octylphenol (3,000 tons), and polyisobutylene (3,000 tons).

KANEGAFUCHI KAGAKU K.K.
Plant site: Takasago, Hyogo Prefecture.
• Construction: Planning to produce ethylene (14,000 tons per year), acetylene (15,600 tons), vinyl chloride (48,000 tons), acryl fiber (7,200 tons), and chloroprene (8,600 tons).

KARONITE CHEMICAL CO., LTD. (jointly owned by California Chemical Co., Kao Soap Co., Ltd., and Nomura Jimusho, Inc.).
Plant site: Kawasaki.
• Construction: Building a new alkylphenol (1,200 tons per year) and lubricating-oil additive (6,500 tons) plant, with possible startup of production in 1962. Raw material will be nonene.

KOKAN CHEMICAL CO., LTD.
Plant site: Kawasaki.
• Construction: Planning to produce styrene monomer (13,000 tons per year), and polystyrene (6,000 tons) by the end of this year, from ethylene and benzene.

KURASHIKI RAYON CO., LTD.
Plant site: Mizushima, Okayama Prefecture.
Raw material: Naphtha.
• Construction: Planning to produce petroleum acetylene, acetaldehyde, and other products in 1963, from naphtha.

KYOWA GAS CHEMICAL IND. CO., LTD.
Plant: Nakajo, Niigata Prefecture.
Raw material: Natural gas.
Products: Hydrogen cyanide (720 tons per year) and acetone cyanhidrine (940 tons).
• Construction: Planning to increase production of hydrogen cyanide up to 1,560 tons per year. Also planning to produce the following in 1962: acetylene (9,600 tons per year), methanol (33,000 tons), and ammonia (33,000 tons).

MARUZEN OIL CO., LTD.
Plant: Matsuyama, Shikoku.
Raw material: Platformate.
Products: Benzene (3,000 tons per year), toluene (9,600 tons), xylene (9,600 tons), and terephthalic acid (7,750 tons)..
Plant: Shimotsu, Wakayama Prefecture.
Raw material: Refinery gas.
Products: Sec-butanol (6,050 tons per year), MEK (3,520 tons), and alkylphenol (2,000 tons).

MARUZEN PETROCHEMICAL CO., LTD.
Plant site: Goi, Chiba Prefecture.
• Construction: Ethylene, propylene, butenes-butylenes, higher alcohol, MEK, and other products from refinery gas and naphtha are planned for 1963.

MIIKE SYNTHETIC CO., LTD.
Plant site: Ohtake, Yamaguchi Prefecture.
• Construction: Planning to produce 12,000 tons per year of styrene monomer from ethylene in 1962.

MITSUBISHI KASEI KOGYO K.K.
Plant site: Mizushima, Okayama Prefecture.
• Construction: Planning to produce ethylene (43,100 tons per year), propylene (34,700 tons), and acetaldehyde (63,200 tons) from naphtha and ethylene.

MITSUBISHI MONSANTO CHEMICAL CO. (jointly owned by Mitsubishi Kasei and Monsanto Chemical Co.).
Plant: Yokkaichi.
Raw material: Styrene and acrylonitrile.
Products: Polystyrene (14,400 tons per year) and SN copolymer resin (3,000 tons).

MITSUBISHI OIL CO., LTD.
Plant: Kawasaki.
Raw material: Platformate.
Products: Benzene (4,440 tons per year), toluene (9,360 tons), and xylene (7,800 tons).

MITSUBISHI PETROCHEMICAL CO., LTD.
Plant: Yokkaichi.
Raw material: Refinery gas and naphtha.
Products: Ethylene (22,000 tons per year), polyethylene (10,000 tons), styrene monomer (18,000 tons), ethylene oxide (2,700 tons), ethylene glycol (3,000 tons), benzene (13,000 tons), toluene (14,000 tons), and xylene (11,000 tons).
• Construction: Planning to increase the production of the following in 1961: ethylene (up to 44,000 tons per year), polyethylene (up to 25,000 tons), ethylene oxide (up to 7,000 tons), ethylene glycol (up to 4,500 tons), and styrene monomer (up to 33,000 tons). Also planning to produce the following in 1962: polypropylene (10,000 tons per year), dodecyl benzene (15,000 tons), phenol (15,000 tons), acetone (8,000 tons), MIBK (6,000 tons), and others.

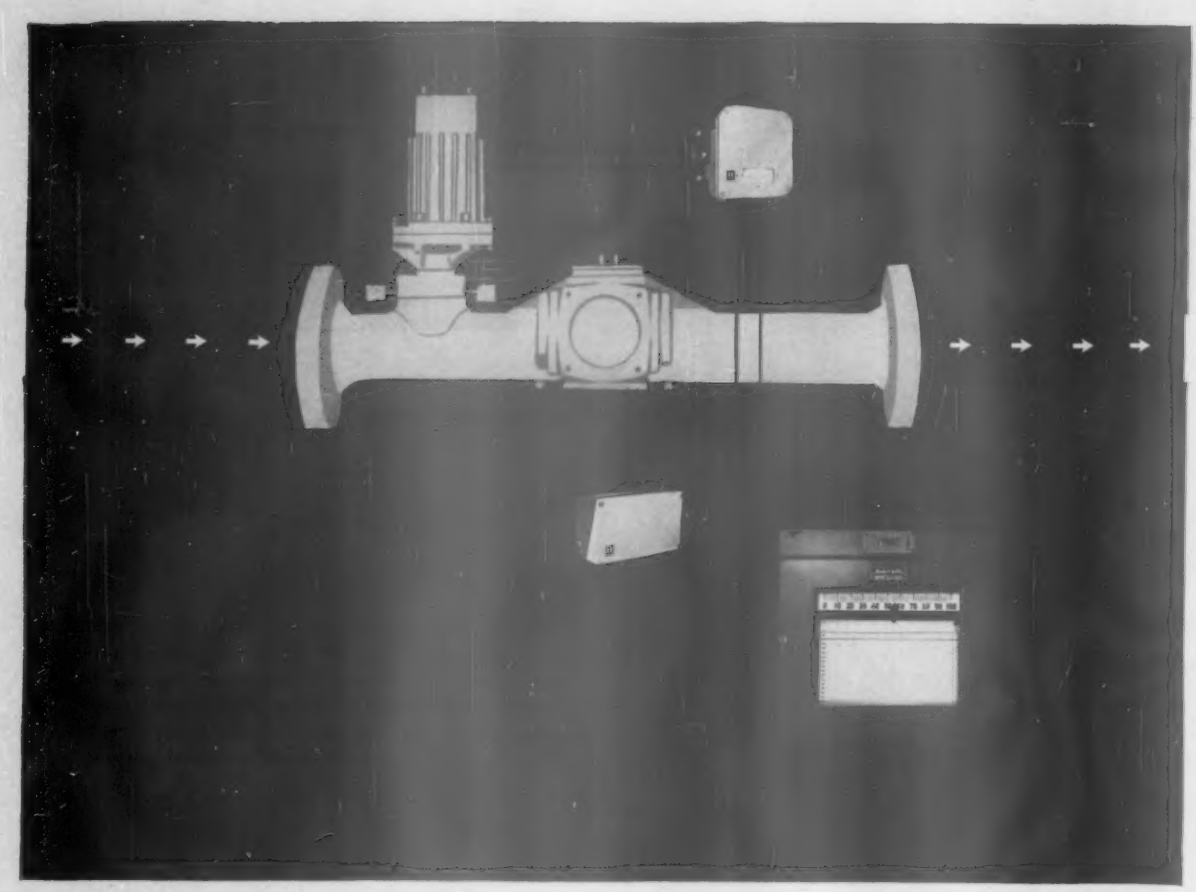
MITSUI CHEMICAL CO., LTD.
Plant: Ohmuta, Kyushu.
Raw material: Propylene.
Product: 2,400 tons per year of propylene glycol.
• Construction: Planning to increase the production of propylene glycol up to 3,600 tons per year by the end of 1961.
Plant: Osaka.
Raw material: Phenol.
Product: Nonyl phenol (1,200 tons per year).
Plant: Nagoya.
Raw material: Propylene and phenol.
Products: Polypropylene glycol (3,600 tons per year) and bisphenol (3,600 tons).
Plant site: Ohtake, Yamaguchi Prefecture.
• Construction: Planning to produce 10,000 tons per year of polypropylene in 1962.
Plant site: Kawasaki.
• Construction: Mitsui Ethyl Kagaku, to be jointly owned by Mitsui Chemical and Ethyl Corp., is planning to produce 6,800 tons per year of TEL from ethylene.

MITSUI PETROCHEMICAL CO., LTD.
Plant: Iwakuni, Yamaguchi Prefecture.
Raw material: Refinery gas, naphtha, and Platformate.
Products: Ethylene (20,000 tons per year), propylene (13,000 tons per year), polyethylene (12,000 tons), ethylene oxide (12,000 tons), ethylene glycol (9,600 tons), phenol (12,000 tons), acetone 7,200 tons), paraxylene (5,000 tons), terephthalic acid (22,000 tons), benzene (12,000 tons), toluene (14,400 tons), and xylene (12,000 tons).
Plant site: Ohtake, Yamaguchi Prefecture.
• Construction: Planning to produce the following in 1962: ethylene (60,000 tons per year), propylene (40,000 tons), acetaldehyde (24,000 tons), acrylonitrile (10,000 tons), and others.

MITSUI POLYCHEMICAL CO., LTD. (Owned 50% by Du Pont of U. S. and 50% by Mitsui Petrochemical Co.)
Plant site: Ohtake, Yamaguchi Prefecture.
• Construction: Planning to produce 24,500 tons per year of polyethylene in 1952.

NIPPON PETROCHEMICAL CO., LTD.
Plant: Kawasaki.
Raw material: Refinery gas and naphtha.
Products: Isopropanol (10,000 tons per year), acetone (10,500 tons), ethylene (40,000 tons), propylene (35,000 tons), butadiene (6,000 tons), and isopropyl-ether (6,000 tons).
• Construction: Planning to increase the ethylene production to 50,000 tons per year and propylene to 43,000 tons in 1962. Also planning to install a Udex plant to extract benzene (16,300 tons per year), toluene (9,100 tons), and xylene (3.800 tons) by the end of 1961.

NIPPON PETROLEUM DETERGENT CO., LTD. (55% owned by NPCC and 45% by California Chemical Co.).
Plant site: Kawasaki.
• Construction: Planning to produce 15,000 tons per year of alkyl benzene and 1,000 tons of nonene from propylene and benzene by spring 1962.



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NIPPON YUSHI K.K.
Plant: Kawasaki.
Raw material: Ethylene oxide.
Product: Polyethylene glycol (1,200 tons per year).
• Construction: Planning to produce 6,000 tons per year of synthetic glycerine in 1962.

NISSAN CHEMICAL IND. CO., LTD.
Plant: Nagaoka, Niigata Prefecture.
Raw material: Natural gas.
Products: Ammonia (40,000 tons per year) and methanol (18,000 tons).
• Construction: Planning to produce the following in 1962: acetylene (9,150 tons per year), acetaldehyde (12,200 tons), acetic acid (6,880 tons), and others.
Plant site: Toyama, Toyama Prefecture.
• Construction: Planning to produce higher alcohol (12,540 tons per year), polypropylene (10,000 tons) and vinyl chloride (11,880 tons), from crude and propylene.

NITTO CHEMICAL CO., LTD.
Plant site: Kawasaki.
• Construction: Planning to produce the following from propylene and benzene in 1962: acrylonitrile (7,200 tons), alkylbenzene sulfonate (16,800 tons), alkylbenzene (15,000 tons), and others.

NITTO UNICAR CO., LTD.
Plant site: Kawasaki.
• Construction: Planning to produce 27,000 tons per year of polyethylene in 1962.

OSAKA SODA K.K.
Plant site: Sakai, Osaka Prefecture.
• Construction: Planning facilities for ethylene oxide (12,000 tons per year), ethylene and propylene glycol (10,500 tons), propylene oxide (6,000 tons), propylene glycol (4,800 tons), glycerine (5,000 tons), and others.

SANYO YUSHI KOGYO K.K.
Plant: Kawasaki.
Raw material: Ethylene oxide and propylene oxide.
Products: Polyethylene glycol (3,600 tons per year), polypropylene glycol (4,800 tons), and nonyl phenol (2,400 tons).

SHIN-ETSU KAGAKU K.K.
Plant: Naoetsu, Niigata Prefecture.
Raw material: Natural gas.
Products: 1,800 tons per year of methyl chloride, methylene chloride and chloroform, carbon tetra chloride.
• Construction: Planning to produce the following in 1962: acetylene (15,000 tons), methanol (16,000 tons), and ethylene (7,500 tons).

SHIN NIPPON CHISSO HIRYO KOGYO K.K.
Plant site: Goi, Chiba Prefecture.
• Construction: Planning to produce the following from propylene and ethylene in 1962: polypropylene resin (13,000 tons per year), polypropylene film (5,000 tons), polypropylene fiber (5,000 tons), polybutene (5,600 tons), acetaldehyde (30,000 tons), acetic acid (10,000 tons), ethyl acetate (6,000 tons), octanol (10,000 tons), DOP (15,000 tons), and DDP (9,000 tons).

SHOWA DENKO K.K.
Plant: Kawasaki.
Raw material: Propylene, ethylene and o-xylene.
Products: Carbon black (5,000 tons per year), propylene oxide (7,000 tons), propylene glycol (3,600 tons), polyethylene (10,000 tons), and phthalic acid anhydride (3,600 tons).
• Construction: Under way or planned are the following: in 1961, acetaldehyde (24,000 tons per year), acetic acid (15,000 tons), phthalic acid anhydride (3,600 tons), maleic acid anhydride (1,200), ethyl acetate (10,000 tons), and vinyl acetate (6,000 tons); in 1962, higher alcohol (6,000 tons per year), epichlorohydrine (8,000 tons), DDP (9,000 tons), polyethylene (10,000 tons), polypropylene (10,000 tons), formalin (15,000 tons), and petroleum coke (50,000 tons); and in 1964, vinyl chloride (10,000 tons per year).

SHOWA NEOPRENE (jointly owned by Showa Denko & Du Pont).
Plant: Kawasaki.
• Construction: Planning to produce 8,000 tons per year of neoprene from acetylene in 1962.

SHOWA PETROCHEMICAL CO., LTD.
Plant: Kawasaki.
Raw material: Ethylene.
Product: Polyethylene (10,000 tons per year).

SUMITOMO CHEMICAL CO., LTD.
Plant: Niihama, Shikoku.
Raw material: Naphtha.
Products: Ethylene (28,500 tons per year), propylene (8,000 tons), acetylene (8,250 tons), polyethylene (26,000 tons).
• Construction: Planning to increase the capacity of the above plant as follows in 1962: ethylene (up to 55,000 tons per year), propylene (31,000 tons), polyethylene (50,000 tons). Also planning to install 10,000 tons per year plant of polypropylene at Niikama and 360 tons per year plant of acrolein at Tsurusaki, Kyushu.

TEIJIN KASEI K.K.
Plant site: Sakai, Osaka Prefecture.
• Construction: Planning facilities for cumene (13,000 tons per year), propylene derivatives (7,000 tons), acetone (2,000 tons), phenol (9,000 tons), and polycarbonate (9,000 tons).

TEKKO-SHA K.K.
Plant site: Not decided yet.
Raw material: Gasoline.
• Construction: Planning facilities for acetic acid (8,400 tons per year) and formic acid (3,600 tons).

TOHOKU HIRYO K.K.
Plant: Akita.
Raw material: Natural gas.
Products: Ammonia (133,000 tons per year in terms of ammonium sulfate), sulfuric acid (118,000 tons), ammonium sulfate (172,000 tons), and others.

TOKUYAMA SODA K.K.
Plant site: Tokuyama.
• Construction: Planning to produce the following from ethylene and propylene in 1962: polypropylene (10,000 tons per year) and polyethylene (10,000 tons).

TONEN PETROCHEMICAL CO., LTD. (100% subsidiary of Toa Nenryo Kogyo K.K.).
Plant site: Kawasaki.
• Construction: Planning to produce the following from naphtha in 1962: ethylene (40,000 tons per year), propylene (32,000 tons), butadiene (7,200 tons), octanol (6,000 tons), and iso-butanol (3,800 tons).

TOYO GAS CHEMICAL IND. CO., LTD.
Plant: Niigata.
Raw material: Natural gas.
Products: Urea (40,000 tons per year) and ammonium sulfate (40,000 tons).

TOYO HIGH-PRESSURE IND. CO., LTD.
Plant: Mobara, Chiba Prefecture.
Raw material: Natural gas.
Products: Methanol (36,500 tons per year) and hydrogen cyanide (5,500 tons).
• Construction: Planning to increase the above products as follows by the end of 1961: methanol (up to 110,000 tons per year) and hydrogen cyanide (to 7,000 tons). Also planning to produce 6,000 tons per year of carbon black in 1962.

UBE KOSAN K.K.
Plant site: Goi, Chiba Prefecture.
Raw material: Ethylene, propylene, butenes-butylenes, benzene, formalin, and methane.
• Construction: Under way or planned are the following in 1962, cyclohexane (17,000 tons per year); in 1963, alkylbenzene (12,000 tons per year); in 1964, polybutadiene (11,100 tons per year) and polyethylene (20,000 tons); in 1965, polyisoprene (14,300 tons per year) and formalin (35,000 tons); and in 1967, ABS resin (6,000 tons per year) and MIBK (6,000 tons).

KOREA

KOREAN GOVERNMENT.
Plant: Chung-Ju.
Product: 270 tons per day of urea.

KUWAIT

KUWAIT PETROCHEMICAL CO., LTD. (owned 40% by the Kuwait Government; 40% by Oronzio de Nora Associates, an Italian engineering firm; and 20% by others).
Plant site: Not known.
• Construction: Using natural gas as raw material, plans call for facilities to produce 31,400 tons per year of caustic soda, 42,000 tons of polyvinyl chloride, and 156,000 tons per year of urea. Construction is to begin in October 1961, with completion in 1963.

LIBYA

SOC. INDUSTRIALE LIBICA.
Plant site: Near Tripoli.
• Construction: Agreement signed with Lurgi Gesellschaft of Frankfurt, Germany for construction of detergents plant.

MALAYA

STANDARD-VACUUM OIL CO., 100 Westchester Ave., White Plains, N. Y.
• Construction: Plans call for a new refinery and chemical-fertilizer plant. Preliminary plans call for production of ammonium sulfate and urea. Contractor is Wah Chang Corp., New York.

MEXICO

CELANESE MEXICANA (partly owned by Celanese Corp., New York, and Chem-

cell, Ltd., Montreal), **QUIMICA GENERAL, S.A.,** and **FARBWERKE HOECHST.**
Plant site: Mexico City.
• Construction: Plans call for facilities to produce petrochemicals at Mexico City.

PEMEX (Petroleos Mexicanos), Apdos. 34 Bis.-36 Bis., Av. Juarez 94, Mexico 1, D. F.
Plant: Atzcapotzalco (near Mexico City).
Products: Sulfur (35 tons per day) and dodecylbenzene (45 tons per day).
• Construction: Polyethylene plant (ICI process), with capacity of 22,000,000 lb. per year, is being engineered by Simon-Carves, London.
Plant: Ciudad Madero, near Tampico.
Product: Sulfur (40 tons per day).
• Construction: Arthur G. McKee & Co. has contract for facilities to produce dodecylbenzene (45 tons per day), butadiene (30,000 tons per year), styrene (15,000 tons per year), and copolymer (20,000 tons per year).
Plant site: Coatzacoalcos.
• Construction: Lummus Co. has contract for facilities to produce ethyl chloride (15,000 tons per year), ethylene dichloride (22,000 tons per year), and vinyl chloride (10,000 tons per year). Hoechst & Uhde has contract for acetaldehyde facilities (30,000 tons per year). Pemex is associated with private groups in construction of facilities for tetraethyl lead (24,000,000 lb. per year).
Plant site: Minatitlan.
• Construction: Fluor Corp. has contracts for 200-ton per day anhydrous ammonia plant and an aromatics extraction plant to produce benzene, toluene, cumene, ethylbenzene, orthoxylene, cyclohexane, and mixed para- and metaxylenes.
Plant site: Salamanca.
• Construction: Lummus Co. has contract for 200-ton per day anhydrous ammonia plant.
Plant site: Tampico.
• Construction: E. I. du Pont de Nemours & Co. will have an interest with Pemex in Mexico's first tetraethyl lead plant, with construction starting in 1961. Cost will be $8 million.

QUIMICA ORONITE (subsidiary of California Chemical Co., 200 Bush St., San Francisco 20, Calif.).
Plant: Tlanepantla.
Raw material: Petroleum-base stocks.
Product: Lube-oil additives.

NETHERLANDS

AKU (Algemene Kunstzijde Unie, N.V.), 76 Verlperweg, Arnhem.
Product: Styrene.

AKU and **BRITISH INDUSTRIAL PLASTICS.**
• Construction: These companies reportedly will build a plant for manufacture of urea and melamine formaldehyde and resins.

ALBATROS SULFURIC ACID & CHEMICAL WORKS, Malibaan 81, Utrecht.
Plant: Vlaardingen.
Raw material: Refinery sludge from Shell refinery.
Product: Surfuric acid (100,000 metric tons per year).

ALCHEMICA, N.V., of Schoonebeek (a subsidiary of Scado - Archer - Daniels, N.V.).
Product: Phthalic anhydride (1,200 tons per year).

CALTEX PETROLEUM MAATSCHAPPIJ (NEDERLAND), N.V., Conradkade 178, The Hague.
Plant: Pernis.
Raw material: Refinery gas.
Product: Sulfur (8 long tons per day).

CHEMISCHE INDUSTRIE UITHOORN, N.V., Box 9, Uithoorn.
Plant: Uithoorn (near Amsterdam).
Product: Phthalic anhydride (5,000 tons per year).

CONTINENTAL-COLUMBIAN CARBON (NEDERLAND), N.V., 10 Welplaatweg, Spijkinesse.
Plant: Rotterdam.
Products: Carbon black (30,000,000 lb. per year of HAF and ISAF).

DU PONT DE NEMOURS (NEDERLAND) N.V., Stadhoudersplantsoen 214, The Hague.
Plant site: 2e Merwedehaven, Dordrecht.
• Construction: Scheduled for completion late 1961 is a new 15,000,000-lb. per year acrylic-fiber plant. Scheduled for completion in 1962 is a new plant for processing acetal resins.

ESSO NEDERLAND, N.V., Esso Gebouw, Benoordenhoutseweg 7, The Hague.
Plant site: Botlek (near Rotterdam).
• Construction: Scheduled for completion summer 1963 is a $17-million petrochemical plant for production of about 220,000 tons per year of such products as benzene, toluene, and xylenes. Feed stocks to come from Esso's new Rotterdam refinery.

FOSTER GRANT CO., INC., 289 N. Main St., Leominster, Mass.
Plant site: Near Rotterdam.
• Construction: Considering construction of resin-polymerization facilities and possibly raw-materials manufacturing.

IMPERIAL CHEMICAL INDUSTRIES, LTD., Imperial Chemical House, Millbank, London SW 1.
Plant site: Near Rotterdam.
• Construction: Scheduled to start in 1962 is construction at a $280-million petrochemical complex to be built here over the next 10 years.

KETJEN CARBON, N.V., Nieuwendammerkade 1-3, Amsterdam.
Plant: Rotterdam.
Product: Carbon black (27,000 tons per year).

KONINKLIJKE ZWAVELZUURFABRIEKEN, KETJEN, Nieuwendammerkade 1-3, Amsterdam.
Plant: Amsterdam.
Raw material: Benzene.
Product: Synthetic phenol (10,000 tons per year).

MEKOG (N.V. Maatschappij Tot Exploitatie Van Kooksovengassen), Ijmuiden.
Plant: Ijmuiden.
Raw material: Natural gas.
Product: Ammonia synthesis gas (234 short tons of ammonia per day).
Raw material: Heavy fuel oil.
Product: Ammonia synthesis gas (114 short tons of ammonia per day).
Plant site: Pernis.
• Construction: Plant for ammonium-nitrate production. Capacity 285 tons daily. Contractor is Ste. Belge de l'Azote et des Produits Chimiques du Marly.

NEDERLANDSCHE DOW MAATSCHAPPIJ, N.V. (wholly owned by Dow Chemical Co.), Stationsplein 45, Rotterdam.
Plant: Rotterdam.
Product: Styrene-butadiene latex.

NEVILLE CINDU CHEMIE, N.V. (owned by Neville Chemical Co., Pittsburgh, Pa., and Chemische Industrie Uithoorn, N.V.), Amsteldijk Noord 66, Uithoorn.
Plant: Uithoorn.
Raw material: Unsaturated petroleum fractions.
Products: Aromatic petroleum solvents, heat-reactive resins, and thermoplastic resins.

N.V. CHEMISCHE INDUSTRIE AKU-GOODRICH (owned jointly by B. F. Goodrich and AKU, Velperweg 76, Arnhem).
Plant: Arnhem.
Product: Nitrile and SBR latices and styrene-butadiene copolymers.
• Construction: Expansion of general production.

N.V. PETROCHEMIE AKU-AMOCO (formed by Amoco International, S.A., and **AKU** (Algemene Kunstzijde Unie, N.V., 76 Verlperweg, Arnhem).
Plant site: Delfzijl.
• Construction: This new company plans to build a plant to make dimethyl terephthalate, using oxidation process and starting with paraxylene. Scheduled for completion in 1963.

ROTTERDAMSE OLEFINEN MAATSCHAPPIJ (associated with Montecatini and Royal Dutch-Shell Group), Hofplein 20, Rotterdam.
Plant site: Rotterdam (Pernis).
• Construction: Facilities for manufacture of 22,000,000 lb. per year of isotactic polypropylene will be completed in 1962.

SHELL NEDERLAND CHEMISCHE FABRIEKEN, N.V. (Royal Dutch-Shell Group), Postbus 644, Rotterdam.
Plant: Rotterdam (Pernis).
Raw material: From adjacent Shell refinery.
Products: Styrene, butadiene, sulfur, synthetic detergents, polyvinyl chloride, resins, solvents, insecticides, alkyl chloride, epichlorhydrin, and synthetic glycerin.
• Construction: Work is under way at Pernis on a new plant for manufacture of polyisoprene and polybutadiene. This will be the first such commercial availability of these products in Europe.

STAATSMIJNEN IN LIMBURG, Heerlen.
Plants: Beek Geleen/Lutterade, and Rotterdam.
Raw materials: Both carbonchemicals and petrochemicals, including coke-oven gas, coke, methane, naphthalene from coke-oven gas, phenol, ethylene, and methanol.
Products: At Geleen, production of nitrogen fertilizers from coke-oven gas, coke, and methane was at about 230,000 tons.

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Capacity for phthalic anhydride from coke-oven-gas naphthalene was 5,000 tons per year. Caprolactam is produced from phenol. At Beek, capacity of high-pressure and low-pressure polyethylene will be 35,000 tons in the near future. With Dow Chemical at Rotterdam, the company produces phenol from toluene. Purification of coke-oven gas yields benzene, toluene, xylene, crude tar, anthracene, naphthalene, creosote oil, and pitch. Other products include pyridene, potassium ferrocyanide, sulfuric acid, nitric acid, and several industrial gases.

- Construction: At Beek a cracking plant for light gasolines is being built to cover the needs for ethylene. Also under construction are facilities for capacity of 25,000 tons of formaldehyde (40% solution in water), from methanol.

PAKISTAN

CONSTOCK INTERNATIONAL METHANE, INC., and PAKISTAN PETROLEUM, LTD.
Plant site: Sui area, West Pakistan.
- Construction: A 300,000-ton per year carbon-black plant. Raw material would be natural gas from Sui field.

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Plant: Multan, West Pakistan.
Raw material: Natural gas from Sui field.
Product: Ammonium nitrate (103,000 tons per year), and urea (59,200 tons per year).
Plant site: Fenchuganj, East Pakistan.
- Construction: Scheduled for completion late 1961 is a new fertilizer plant with capacity of 225 tons per day of ammonia and 375 tons per day of urea. Raw material will be natural gas from Sylhet field.

PAKISTAN GOVERNMENT
- Construction: Plans call for new facilities for plastics, fibers, and petrochemicals based on natural gas.

PANAMA

GOLDEN EAGLE CO. OF PANAMA (owned by Ultramar Co. Ltd., 1-2 Broad St. Place, London, EC. 2, England).
Plant site: Portobelo, on the Atlantic coast.
- Construction: A 60,000-bbl. per day refinery and petrochemical plant will be completed here November 1962. Contractor is Arthur G. McKee & Co.

PERU

FERTILIZANTES SINTETICOS, S.A.
Plant: Callao (seaport for Lima).
Raw material: Fuel oil.
Products: Anhydrous ammonia (20,000 metric tons), ammonium sulfate fertilizer (7,500 tons), ammonium nitrate—fertilizer and technical grades—(35,000 tons), nitric acid—98% by weight—(1,500 tons), and nitric acid—53% by weight—(54,000 tons).

PORTUGAL

AMONIACO PORTUGUES, SARL, Ruo de Silva Carvalho 234-1, 2 e 3 andares, Lisbon 2.
Plant: Estarreja near Oporto and Aveiro.
Raw material: This includes heavy gasoline.
Product: 110,000 tons per year of ammonium sulfate (50,000 tons of which are obtained from heavy gasoline and 60,000 tons from water electrolysis).
- Construction: This company is studying possibility of facilities to make 50 tons per day of urea from heavy gasoline.

NITRATOS DE PORTUGAL, SARL, Rua dos Navegantes 53, Lisbon 2.
Plant: Location not known.
Raw material: Ammonia from SACOR refinery.
Products: Calcium ammonium nitrate (100,000 tons per year), calcium nitrate (15,000 tons), and concentrated nitric acid—98% (10,000 tons per year).

PORTUGUESA DE PETROQUIMICA, SARL, Rua dos Navegantes 53, Lisbon 2.
Plant: Lisbon.
Raw material: Light hydrocarbons.
Product: Ammonia (185 tons per day), pure hydrogen, nitrogen, oxygen, and carbon dioxide.

RESINAS SINTETICAS, LDA.
Plant: Near Lisbon.
Products: Maleic, alkyd, and phenolic resins (600 tons per year), and urea-formaldehyde (1,000 tons).

SACOR (Soc. Anonima Concesionaria del Refinagao de Petroleos), Rua do Alecrim 57, Lisbon.
Plant: Cabu Ruivo.
Raw material: From refinery.
Products: Ammonia and other petrochemical feed stock.

SHINETSU CHEMICAL and MITSUI TRADING CO. (in a joint venture with four Portuguese companies).
- Construction: Polyvinyl chloride plant with initial capacity of 300 to 500 tons per month.

UNIAO FABRIL DO AZOTO, Avenida da Liberdade 42, Lisbon.
Plant: Barreiro.
Raw material: Ammonia from Portuguesa de Petroquimica's Lisbon plant.
Product: Ammonium sulfate (200,000 tons per year).
Plant: Lavradio. (Montecatini is a licensor at this facility.)
Raw material: Ammonia.
Product: 100% ammonium nitrate (65,000 tons per year). This facility was completed August 1961.
- Construction: Scheduled for completion in November 1962 is capacity of 59,000 tons per year of anhydrous ammonia from light hydrocarbons. Also scheduled for completion in November 1962 is capacity for 40,000 tons per year of urea from ammonia.

SOUTHERN RHODESIA

AMERICAN INDEPENDENT OIL CO., 50 Rockefeller Plaza, New York 20, N. Y.
Plant site: Between Salisbury and Umtali.
- Construction: A new refinery is planned, following signing of contract with the government. The refinery would be on stream by end of 1963 and would form nucleus of a $50-million petrochemical complex, including a nitrogenous fertilizer plant.

SPAIN

CALVO SOTELO (Empresa Nacional Calvo Sotelo de Combustibles Liquidos y Lubricantes, a subsidiary of INI), Apartado 867, Madrid 6.
Plant: Puertollano.
Raw material: Shale oil.
Products: Nitrogen fertilizers (100,000 metric tons per year), and other products such as solvents, waxes, and lubes.
- Construction: Plans call for a crude-oil refinery and integrated petrochemicals plants here.

CEPSA (Cia. Espanola de Petroleos, S.A.), Avenida de America 28, Madrid.
Plant: Tenerife.
Raw material: Naphthenic cut.
Products: 10,000 metric tons per year of benzene, toluene, and xylenes.
Plant site: Not known.
- Construction: Plans to produce olefin derivatives are now being contemplated through a joint venture with Esso Standard Co. (N. J.).

CINSA (Cia. Insular del Nitrogeno, S.A.), a subsidiary of CEPSA, Avenida de America 28, Madrid.
Plant: Las Palmas, Canary Islands.
Raw material: Liquid petroleum products.
Products: Ammonium sulfate (333 tons per day).

DOW-UNQUINESA (Dow Chemie, A.G., and Union Quimica del Norte de Espana, S.A.), Apartado 502, Bilbao.
Plant site: Somorrostro (near Bilbao).
- Construction: The Spanish Government has approved a $30-million project for treatment of 67,000 tons of naphthas per year for production of 21,000 tons of ethylene and corresponding quantities of other olefins and residual fractions, which will be transformed into 16,000 tons per year of high and low-pressure polyethylene, 8,000 tons of polypropylene, 12,000 tons of styrene monomer, 17,000 tons per year of methanol, and unspecified quantities of polymers and copolymers of styrene. Due on stream early 1963.

INI (Instituto Nacional de Industria)—See Calvo Sotelo listing.

REPESA (Refineria de Petroleos de Escombreras, S.A., owned by Caltex, INI, and CEPSA), Carrera de San Jeronimo 36, Madrid.
Plant site: Cartagena.
- Construction: This company is authorized to produce 80,000 tons per year of nitrogen, principally in the form of ammonium sulfate. Location is at a refinery.

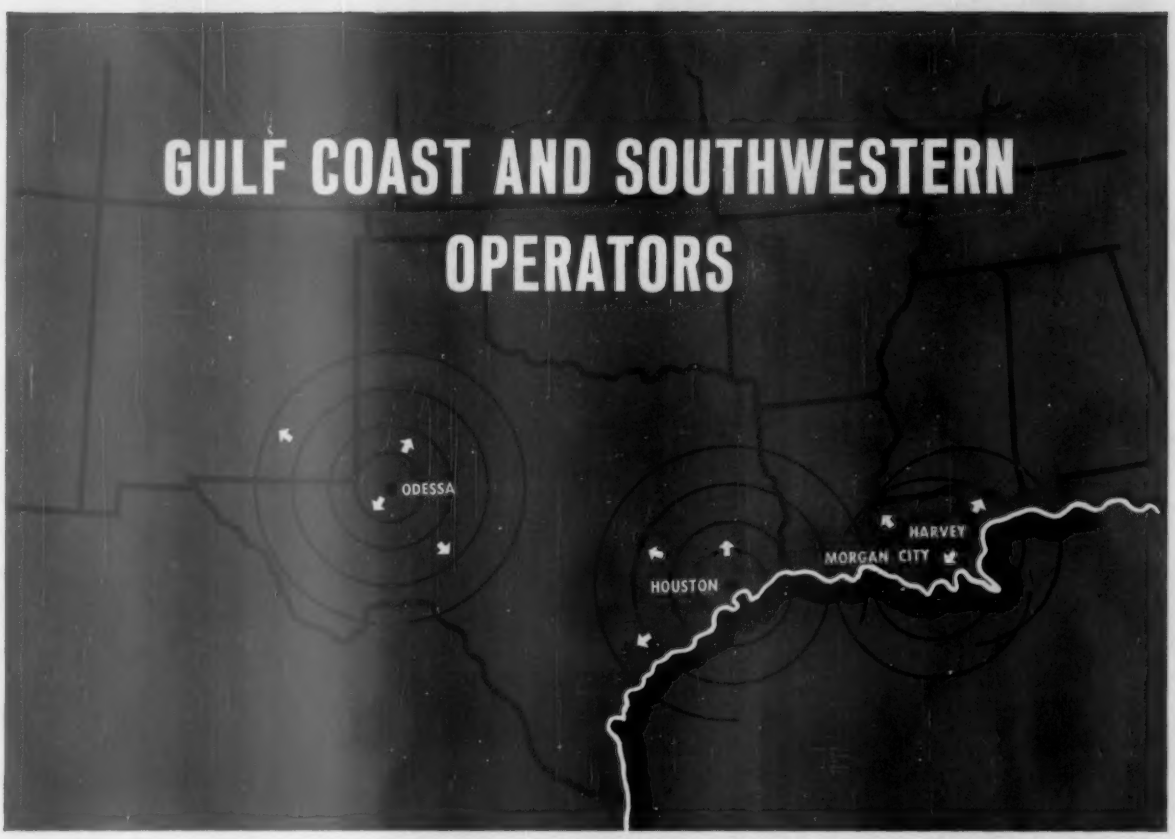
SWEDEN

MO OCH DOMSJO, A.B., Strandvagen 1, Stockholm.
Plant site: Stenungsund.
- Construction: A 15,000-ton per year ethylene-oxide plant is scheduled to open in about 2 years, using ethylene from the Svenska Esso unit at Stenungsund. In connection with this unit, an ethylene-glycol plant will be built, with design capacity of 10,000 tons per year.

SVENSKA ESSO, A.B., Fack, Stockholm 5.
Plant site: Stenungsund.

(Continued on p. 169)

GULF COAST AND SOUTHWESTERN OPERATORS



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In refineries, chemical plants, and oil fields, many "old timers" associate the name "Fisher" with high quality control valves and liquid level controllers. Through the years, in their work on instruments and controls, they have come to know that "Fisher" means dependability.

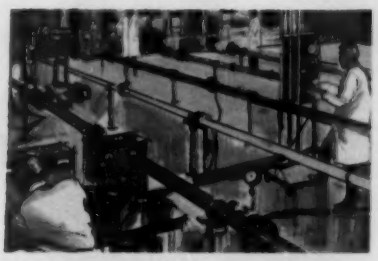
"Put a 'Fisher' in the line, and forget it." they would always say.

The quality found in Fisher equipment lies not only in metal and fiber and paint. It is also found in the practical design, manufacturing techniques, and the rigid inspection program. These high quality factors along with outstanding research and engineering facilities assure you of trouble-free performance. Throughout the world, "Fisher" means dependable control equipment.

FISHER GOVERNOR COMPANY *Marshalltown, Iowa / Woodstock, Ontario / Rochester, England*

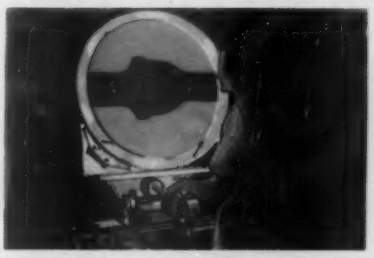
Continuous Advanced Research . . . Fisher research maintains a continuous program for development and use of new metals and materials to meet the increasingly severe conditions, encountered daily, in the nuclear and cryogenics fields.

Engineering and Research . . . Almost three-fourths of Fisher's 41 graduate engineers have more than 10 years service . . . a total of 380 years experience in design engineering aimed at solving industry's flow control problems, practically and efficiently.



Testing and Development . . . Representative of the very latest and finest in equipment that aids Fisher engineers in the development of new and improved products is the recent addition of a test line that is capable of handling air or water pressures up to 2,500 psi.

Latest Production Methods . . . Various new style grinders produce a super-finish on Fisher valve guides and bushings, second to none in the industry. It is typical of precision manufacturing methods that assure long, trouble-free operation of Fisher controls.



Rigid Inspection Procedures . . . The highest ratio of inspection personnel to production personnel in the industry is maintained at Fisher. As an example, there are no less than 704 inspection operations on a 4" Type 657-A diaphragm control valve.

Efficient and Fast Service . . . "Supermarket" 36-hour delivery, from the factory, on popular sizes and types of controls is only one of many services available to Fisher customers. Seventeen sales offices throughout the country maintain field stocks for immediate delivery.

If it flows through pipe anywhere in the world ...chances are it's controlled by.....

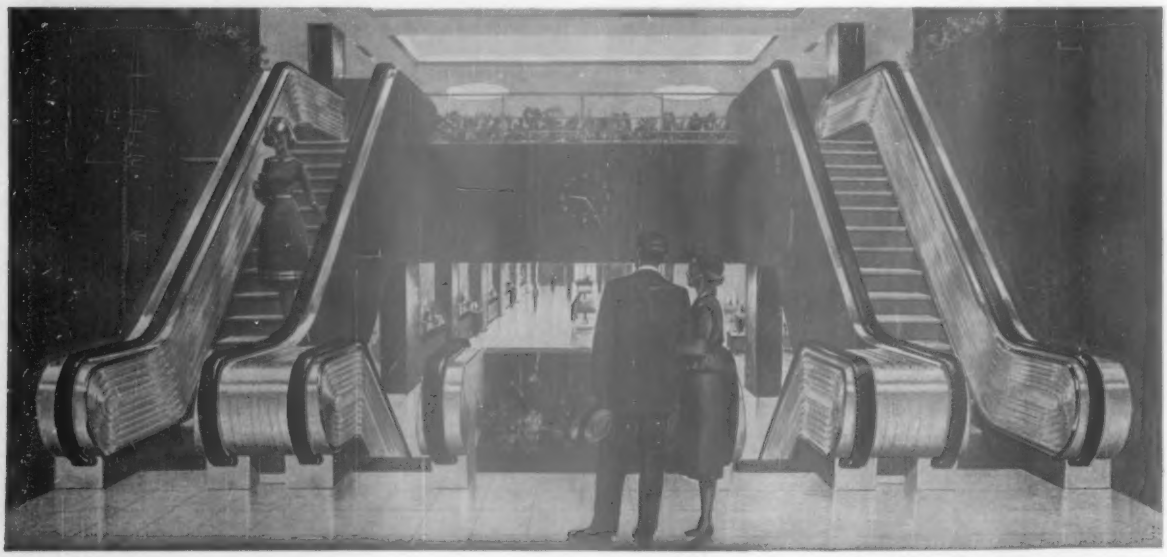
FISHER®

SINCE 1880

NATIONAL BANK OF TULSA

INVITES YOU TO ENTER A NEW WORLD OF OIL BANKING

NBT is proud that its recent remodeling program has not only brought about physical changes, but has also helped to create a New World of Banking. This is especially true in NBT's Oil Department where banking men know oil as well as they know banking. You're cordially invited to enter a New World of Oil Banking by visiting the Oil Department of the National Bank of Tulsa . . . Oil Bank of America.



member federal deposit insurance corporation

• Construction: By July 1963, this company is scheduled to go on stream with a 5,000 to 6,000-bbl. per day unit to produce ethylene, propylene, and butadiene. Feed stock will come from Esso refineries outside of Sweden, one of which is under construction at Oslo. Contract for the petrochemical facilities was awarded to Fluor Corp., Ltd.

UNION CARBIDE CORP., 30 E. 42 St., New York 17, N. Y., and **SUPERFOSAT FABRIKS AKTIEBOLAG.**
Plant site: Toghenburg.
• Construction: A 15,000-ton per year polythene plant is planned by these two companies, with feed stock to come from Svenska Esso's plant at Stenungsund. Completion scheduled in 1962.

TRINIDAD

FEDERATION CHEMICALS, LTD. (W. R. Grace & Co.), 7 Hanover Square, New York 5, N. Y.).
Plant: Point Lisas (near Pointe-a-Pierre).
Raw material: From locally produced gas.
Products: Ammonia (100 tons per day), urea (70 tons), sulfuric acid (200 tons), and ammonium sulfate (245 tons per day).

TEXACO TRINIDAD, INC., Pointe-a-Pierre.
Plant: Pointe-a-Pierre.
Raw material: Refinery.
Products: Aromatics.

UNION OF SOUTH AFRICA

AFRICAN EXPLOSIVES & CHEMICAL INDUSTRIES (subsidiary of Imperial Chemical Industries, Millbank, London, SW 1, England).
Plant: Nodderfontein.
Products: Ammonia (70,000 tons per year), methanol, formaldehyde, and ureaformaldehyde resins.

PHILLIPS CARBON BLACK CO. PTY., LTD. (owned jointly by Phillips Petroleum International Corp. and Industrial Development Corp. of South Africa, Ltd.), P. O. Box 862, Port Elizabeth, Union of South Africa.
Plant: Port Elizabeth.
Product: Carbon black (22,000,000 lb. per year of GPF, FEF, HAF, and ISAF).

UNITED KINGDOM

BP-CALIFORNIA, owned jointly by California Chemical Co. and British Petroleum Co., Ltd., Britannic House, Finsbury Circus, London EC 2.
Plant site: Isle of Grain, Kent.
• Construction: A new plant for para and orthoxylene is being built adjacent to the BP refinery. This joint venture is one of two aromatic projects, with the other to be located at Dinslaken, Germany. Completion set for spring 1962.

BRITISH CELANESE CO., LTD., Celanese House, Hanover Square, London W 1.
Plant: Spondon, Derby, England.
Raw material: From thermal cracking process.
Products: Ethanol for acetic acid and isopropanol acetone.

BRITISH GEON CO. (owned by Distillers Co., Ltd., and B. F. Goodrich Chemical), Devonshire House, Piccadilly, London W 1.
Plant: Barry, South Wales.
Product: 38,000 tons per year of polyvinyl chloride.

BRITISH HYDROCARBON CHEMICALS, LTD. (owned by British Petroleum, Ltd., and Distillers Co., Ltd.), Devonshire House, Mayfair Place, London W 1.
Plant: Grangemouth, Scotland.
Raw material: From nearby BP refinery.
Products: Ethylene, ethylene dichloride, ethanol, diethyl ether, polyethylene, propylene, isopropanol, cumene, acetone, tetropropylene, phenols, and butadiene.
• Construction: Scheduled for completion in 1961 are new plants to produce butadiene from C_4 stream and methanol from methane.
Plant site: Baglan Bay, Port Talbot, South Wales.
• Construction: A $28-million petrochemical development will be built some 3 miles from BP's Llandarcy refinery, with completion late 1962. Ethylene will be produced from naphtha, ethylene dichloride from ethylene, and butadiene from C_4 stream.

BRITISH PETROLEUM CO., LTD., Britannic House, Finsbury Circus, London EC 2.
Plant: Grangemouth, Scotland.
Raw material: Refinery sour gas.
Product: Sulfur (4,000 tons per year).
Plant: Kent.
Raw material: Refinery sour gas.
Product: Sulfur (6,000 tons per year) and special solvents (30,000 tons per year).

BRITISH SYNTHETIC RUBBER CO., LTD. (consortium of eight rubber companies).
Plant: Hythe, near Southampton.
Raw material: Butadiene and styrene.
Products: Synthetic rubbers of various grades (90,000 tons per year) and latex (2,500,000 gal. per year).

BRITISH VISQUEEN, LTD. (subsidiary of Imperial Chemical Industries, Ltd.), Six Hills Way, Stevenage, Herts.
Plant: Stevenage, Herts, England.
Product: Polypropylene and polythene film.

CABOT CARBON, LTD., Stanlow, Ellesmere Port, Cheshire.
Plant: Stanlow, Cheshire.
Raw material: Petroleum fractions.
Products: Seven grades of carbon blacks (55,000 tons per year).

CALIFORNIA CHEMICAL CO. (See BP-California listing.)

CHEMSTRAND, LTD., 8 Waterloo Place, London SW 1.
Plant: Coleraine, Northern Ireland.
Raw material: Acrylonitrile.
Product: Acrilan acrylic fiber (15,000,000 lb. per year).
• Construction: By the end of 1962, the capacity will be increased to 25,000,000 lb. per year.

DISTILLERS CO., LTD., Devonshire House, Piccadilly, London W 1.
Plant site: Hull, England.
• Construction: Completion of a $6-million acetic-acid plant is scheduled for early 1962. For new phthalic anhydride project, see listing for Grange Chemical, Ltd.

DU PONT CO. (UNITED KINGDOM), LTD., 76 Jermyn St., London W 1.
Plant: Londonderry, Northern Ireland.
Raw materials: These include propane from Esso's Cork refinery reformed for hydrogen.
Product: Neoprene synthetic rubber (50,000,000 lb. per year).

ESSO PETROLEUM CO., LTD., 36 Queen Anne's Gate, Westminster, London SW 1.
Plant: Fawley, Hants., England.
Raw material: Petroleum fractions.
Products: Ethylene (40,000 tons per year), which goes to nearby Monsanto and Union Carbide facilities; butadiene (42,000 tons per year) which goes to nearby International Synthetic Rubber Co.; and sulfur (30,000 tons per year).
• Construction: England's first butyl-rubber plant will be completed here in 1962. Contract for the $12.5-million installation was awarded to Foster Wheeler, Ltd. Capacity will be about 30,000 tons per year. Scheduled for completion in 1961 are additional facilities for ethylene and butadiene. The ethylene will be delivered 80 miles by pipeline to ICI's new complex at Severnside.

ESSO PETROLEUM CO., LTD., 36 Queen Anne's Gas, Westminster, London SW 1, and **FISONS, LTD,** Harvest House, Felixstowe, Suffolk.
Plant site: Milford Haven, Wales.
• Construction: 150,000-ton per year ammonia plant will be built adjacent to Esso's refinery. Completion is due late 1963.

FORTH CHEMICALS, LTD. (British Hydrocarbon Chemicals, Ltd., and Monsanto Chemicals, Ltd), Devonshire House, Mayfair Place, London W 1.
Plant: Grangemouth, Scotland.
Raw materials: From British Hydrocarbon Chemicals.
Products: Styrene monomer (50,000 tons per year).
Plant site: Baglan Bay, South Wales.
• Construction: New plant will have capacity of 50,000 tons per year of styrene monomer. Ethylene for the $8.4-million project will be supplied by British Hydrocarbon Chemicals.

GEMEC, LTD. (Now Union Carbide, Ltd. See Union listing.)

GRANGE CHEMICALS, LTD. (British Hydrocarbon Chemicals, Ltd., and California Chemical Co.), Devonshire House, Piccadilly, London W 1.
Plant: Grangemouth, Scotland.
Raw material: Tetrapropylene.
Products: Dodecylbenzene for manufacture of high-grade synthetic detergents.
• Construction: Facilities for production of phthalic anhydride from orthoxylene scheduled for completion late 1962. Capacity will be 15,000 tons per year.

IMPERIAL CHEMICAL INDUSTRIES, LTD., Imperial Chemical House, Millbank, London SW 1.
Plant: Billingham, England.
Products: Acetone (36,000 tons per year), phenol (20,000 tons per year), alkylated phenols, carbonylation alcohols, and isopropyl alcohol.
• Construction: Carbonylation alcohols capacity is being increased to more than 140,000 tons per year.

Plant: Dumfries, Scotland.
Product: Polyester film (2,000 tons per year).
Plant: Heysham Works, Lancashire.
Product: Methanol (30,000 tons per year).
- Construction: This will be increased to 75,000 tons per year in 1962.

Plant site: Hillhouse Works near Blackpool.
- Construction: Under way is a polyvinyl chloride plant, which will raise the company's production from present 70,000-80,000 tons per year to 115,000 tons per year by 1963.

Plant site: Kilroot, near Belfast, northern Ireland.
- Construction: Scheduled for completion in 1963 is a new polyester fiber plant.

Plant site: Severnside Site, England.
- Construction: Long-term plans call for a large complex near Avonmouth, with operations largely based on products from petroleum gases. Initial investment will be about £15 million. Scheduled on stream late 1963 is a 100,000-ton per year ammonia plant. Construction includes plant for making 35,000 tons per year of ethylene oxide, ethylene glycol, and related chemicals.

Plant: Wilton, England.
Products: High-purity ethylene (approaching 140,000 tons per year), polypropylene (11,000 tons per year), propylene (more than 80,000 tons per year), ethylene oxide, propylene oxide, propylene glycol, ethylene glycol, polyester fiber (50,000,000 lb. per year), paraxylene for dimethyl terephthalate-based polyester fibers, methane, butylene, butadiene, and other unsaturated hydrocarbons.
- Construction: Polypropylene capacity will be doubled in 1962. An agreement has been signed with Montecatini for use of patent to make polypropylene fiber. Also scheduled is a 10,000-ton per year maleic anhydride plant.

MONSANTO CHEMICALS, LTD., Monsanto House, 10-18 Victoria St., London SW 1.
Plant: Fawley, Hants., England.
Raw material: Ethylene.
Products: Polyethylenes (more than 17,000 long tons per year).
- Construction: Polyethylene capacity will be increased by about 50% by early 1963.

Plant: Newport, Monmouthshire, Wales.
Products: Maleic anhydride (15,000,000 lb. per year), and styrene-butadiene resins and latices (5,000 tons per year).

OROBIS, LTD. (owned by Distillers Co., Ltd., Devonshire House, Piccadilly, London W 1, and California Chemical Co., 200 Bush St., San Francisco, Calif.)
Plant: Hull, England.
Raw material: Petroleum-base stocks.
Products: Lube-oil additives and alkylphenols.

PHILBLACK, LTD. (licensed by Phillips Petroleum Co., Bartlesville, Okla.), 1 Henbury Road, Westbury-on-Trym, Bristol, England.
Plant: Avonmouth, Bristol.
Raw material: Aromatic petroleum residual oils.
Products: Reinforcing furnace carbon blacks in five grades (125,000,000 lb. per year).

SCOTTISH OILS, LTD., 53 Bothwell St., Glasgow C 2, Scotland.
Plant: Pumpherston, Scotland.
Raw material: Petroleum extracts.
Products: Detergents.

SHELL CHEMICAL CO., LTD., Marlborough House, 15-17 Great Marlborough St., London W 1.
Plant: Carrington Works, England.
Raw material: Naphtha.
Products: Ethylene, ethylene oxide (45,000 tons per year), polyethylene, propylene, styrene monomer, propylene oxide, benzene, toluene, xylenes, styrene copolymers, isopropanol, glycol ethers, ethylene glycols, ethanolamines, polyethylene glycols, propylene glycols, propanolamine, polypropylene glycols, ethylene oxide condensates, alcohols, isopropanolamines, ethylene glycol ethers, octyl phenol condensates, and polystyrene molding powders to customer specifications.
- Construction: Scheduled for completion in 1961 is a new plant to produce 30,000 tons per year of polyethylenes and polypropylene. Set for completion in 1963 is a new plant for manufacture of polydiene synthetic rubber.

Plant: Shell Haven Chemical plant.
Raw material: Refinery gases.
Products: Dodecylbenzene (30,000 tons per year), anhydrous ammonia (75,000 tons per year), and elemental sulfur.
Plant: Stanlow chemical plant.
Raw material: Refinery gases.
Products: Olefins, resins, solvents (40,000 tons per year), naphthenic acids, naphthenic sulfonates, detergents, and elemental sulfur.

STO-CHEM, LTD., Stoke Works, Bromsgrove, Worcestershire, England.
Plant site: Stoke Works.
- Construction: Scheduled for completion late 1961 is a new plant to produce 8,000,000 lb. per year of synthetic-rubber latices.

UNION CARBIDE, LTD., 8 Grafton St., London W 1.
Plant: Hythe, Hants., England.
Raw material: Ethylene purchased from Esso's Fawley refinery.
Products: Ethylene oxide and derivatives (20,000 tons per year).
Plant: Grangemouth, Scotland.
Raw material: Ethylene from British Hydrocarbon Chemicals.
Products: High-pressure polyethylenes (15,000 tons per year).
- Construction: Effective from late 1961, plant changes and additions will increase annual capacity to a total of 25,000 to 30,000 tons, depending on product mix.

URUGUAY

ANCAP (Administracion Nacional de Combustibles Alcohoy y Portland), Casilla de Correo 1090, Montevideo.
Plant: Montevideo.
Product: 6 tons of sulfur per day.

VENEZUELA

FABRICA DE PINTURAS, C.A., Montana, Av. Principal a los Cortijos de Lourdes, Caracas.
- Construction: Plans call for investment of $2.5 million in expansion of paint-mahufacturing facilities to include polyvinyl chloride plastic materials and acrylic resins.

INSTITUTO VENEZOLANO DE PETROQUIMICA, Ministirio de Minas e Hidrocarburos, Caracas.
Plant site: Moron.
- Construction: Facilities for ammonia, ammonia products, and others. The institute is also studying a project for production of 20,000 to 40,000 tons per year of butadiene and styrene.

NEGROVEN.
Plant: Moron.
Product: Carbon black (3,000 to 4,000 tons per year).

UNITED CARBON DE VENEZUELA, C.A., (owned by United Carbon Co.; Manufactura de Papel, C.A.; Iversiones Dosco, S.A.; and Grupo Tecnico de Promocion Industrial, C.A.).
Plant site: Valencia industrial area.
- Construction: Work is under way at a 20,000,000-lb. per year carbon-black plant costing $3 million. Lummus Co. is contractor.

YUGOSLAVIA

FABRIKA AZOTNIH DJUBRIVA U IZGRADNJI, Spoljnostarcevacka 72, Pancevo.
Plant: Pancevo (near Belgrade).
Raw material: Natural gas.
Product: Ammonia and nitrogen fertilizers.

JUGOKARBON PODUZECE ZA PROIZVODNJU CADJE I KOMPRIMIRANTH PLINOVA, Senjska cesta 66, Bakar.
Plant: Bakar.
Raw material: Refinery products.
Products: Carbon black and inert compressed gases for domestic appliance.

KIZ (Kemijska Industrijska Zajednica), Boskoviceva 33, Zagreb.
Plant site: Zagreb.
- Construction: A $35-million complex here will involve eight processing units to produce ethylene, polyethylene, styrene, polystyrene, phenol, acetone, benzene, cumene, ethylbenzene, and monostyrene. Foster Wheeler Corp., New York, has engineering and supervisory contract. Raw material will be natural gas.

METAN KEMISKA INDUSTRIJA.
Plant: Kutina, Croatia.
Raw material: Natural gas.
Product: Carbon black.

PROIZVODNJA NAFTE (Tovarna Methanola u Izgradnji), Lj.R.S1, Lendava.
Plant site: Lendava.
- Construction: To go on stream in 1962 are facilities for production of methyl alcohol and formaldehyde. This project is in connection with the Lendava oil-field enterprise. Ste. Belge de l'Azote et des Produits Chimiques du Marly and D. Bonaldi & Co. have contract for facilities to produce synthesis gas for ammonia and methanol by cracking various hydrocarbons.

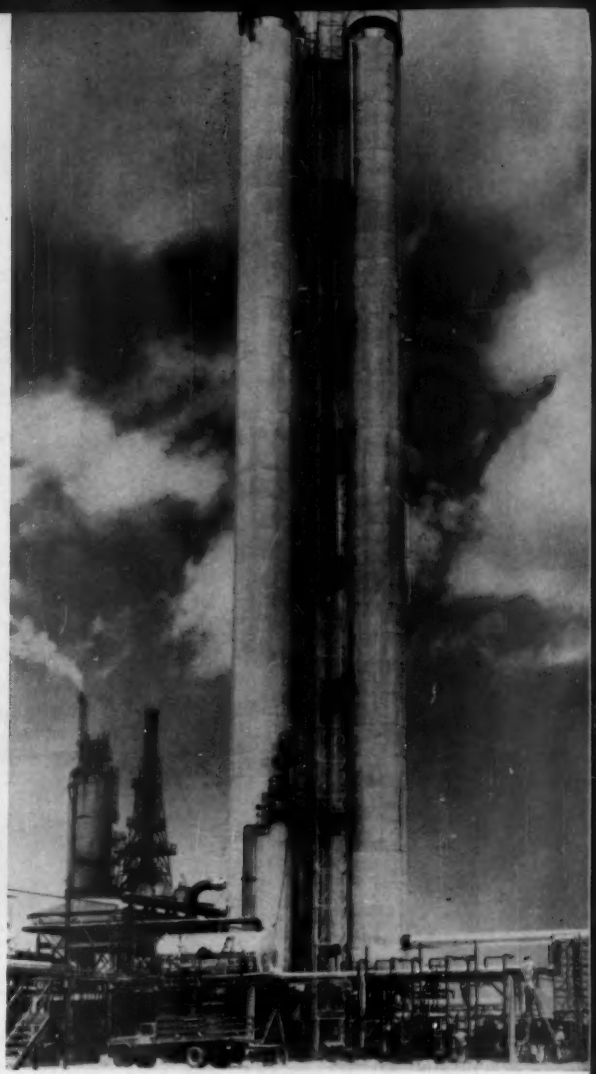
TOVARNA ORGANSKIH BARVIL, br. 117, Celje—Cret, Slovenia.
Plant: Celje—Cret.
Products: Dichloro-, dinitrochloro-, hexachloro-, monochloro-, and nitrochlorobenzene.

Petroleum aromatics:

From specialty operation to $350-million-a-year industry in 10 years

...What's ahead?

BY GEORGE ADAMS AND B. G. CASTEEL
DX Sunray Oil Co.



ETHYLBENZENE separation from xylene by superfractionation as in Suntide's recently completed unit at Corpus Christi, Tex., is in competition with benzene alkylation as a styrene intermediate.

IN THE SHORT SPACE of 10 years, production of aromatic chemicals from petroleum sources has grown from a specialty operation in a few large refineries to a 350-million-dollar-a-year business carried out by 47 of the nation's 300 refineries. This vast industry now consumes approximately 35 million barrels of feed stocks annually and is the major source of supply for users of aromatic compounds.

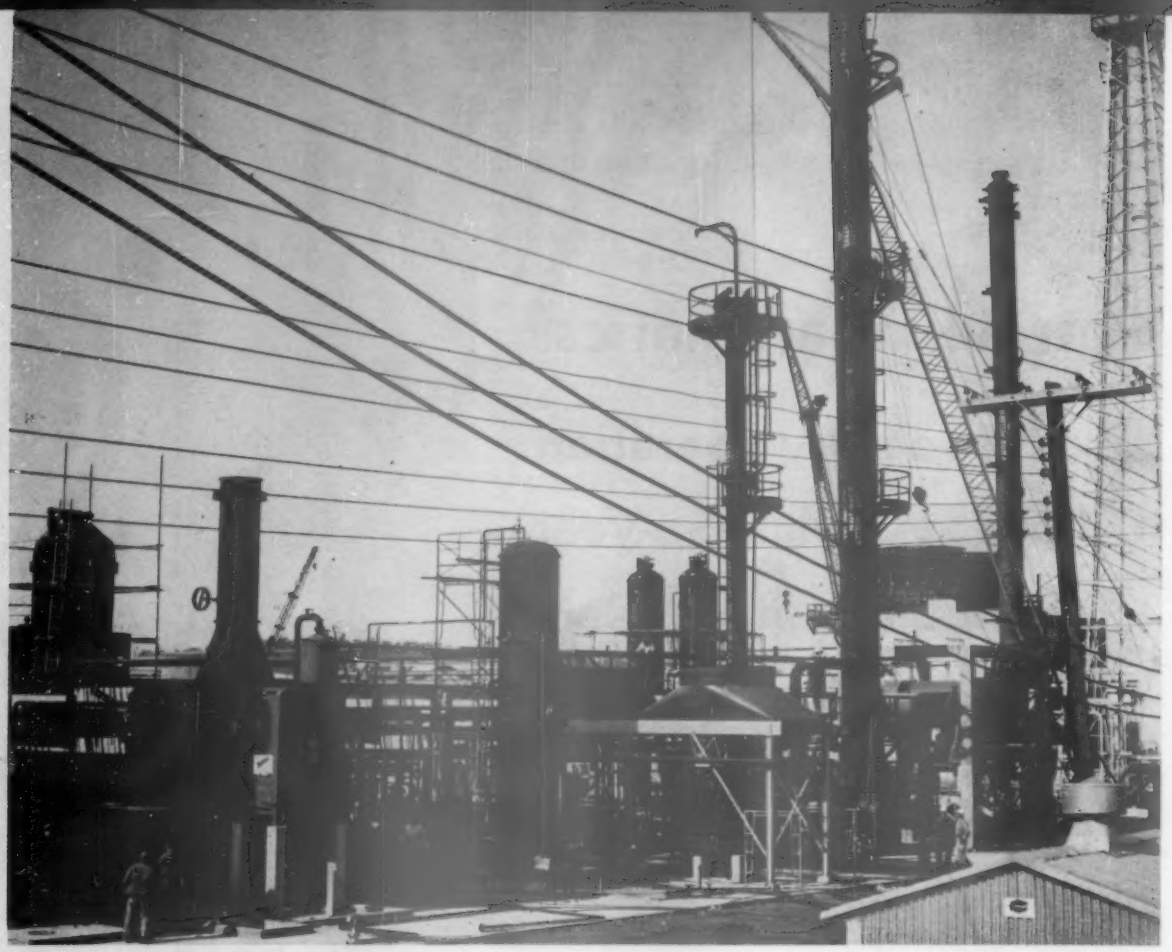
The development of two refinery processes brought about this new industry. These were the platinum-catalyst dehydrogenation processes developed in the late 40's and the improved solvent extraction processes in the early 50's. The combination of these two processes made petroleum derived aromatics economically attractive and resulted in the petroleum industry becoming the major source for aromatic chemicals. Significantly, the products from these processes are not only economically competitive with former sourcess, but are superior in quality.

Benzene

The most important aromatic chemical is benzene, the simplest aromatic compound. The capacity for petroleum-benzene production in operation or planned is approximately 600 million gallons per year. The majority of this benzene is produced by catalytic dehydrogenation of naphthenes naturally occurring in crude oil, followed by solvent extraction of the benzene from the dehydrogenation-unit product.

The quantity of benzene available from this source varies greatly from crude oil to crude oil depending upon the naphthene content in the particular crude. However, the total amount of benzene that can be produced by this method should approximate 1% of crude oil runs or 1.2 billion gallons annually at current crude throughputs. Since benzene available from this source is limited by crude runs for any individual producer, there is a tendency for benzene supply to dry up rapidly when demand exceeds the installed capactiy. These periods of short supply have been characterized by a rush in new construction of benzene production facilities. Periods of oversupply have been characterized by declining benzene prices, reaching a point where additional capacity cannot be justified until demand again raises the price.

A major new process development promises to change the petroleum-derived aromatics picture completely. It is hydrodealkylation. The hydrodealkylation process produces benzene from benzene derivatives, and refiners are turning in ever-increasing numbers to hydrodealkylation to convert their surplus toluene to marketable benzene. With almost twice as much toluene available from crude oil as benzene, this represents a vast potential for additional benzene. Two-thirds of the present toluene production is blended into gasoline and refiners can be expected to upgrade a large portion of this to chemical sales via the hydrodealkylation route. Several such units are already on stream and more are under con-



HYDRODEALKYLATION of toluene into benzene promises to change the petroleum-derived aromatics picture completely. This is DX Sunray's recently completed Hydeal plant in Tulsa.

struction. Economics of benzene production by this route are comparable to production directly from dehydrogenation and extraction, and it does not appear likely that dealkylation of toluene will result in a permanent depression of benzene prices. The total benzene available from all of the potential petroleum derived toluene would be approximately 2 billion gallons per year at present crude runs.

Markets. The growth of markets for benzene has been a little short of phenomenal during the past 5 years. The majority of benzene produced today winds up in styrene, used either as a copolymer in rubber manufacture or for polystyrene plastics. Other uses of benzene are for production of phenol, detergents, synthetic-fiber intermediates, and hundreds of other products. Although it is difficult to predict the future growth pattern of benzene demand, it seems safe to say that this compound will continue to find increased use as a basic chemical building block.

A recent marketing tendency is for refiners to upgrade their benzene to cumene, ethylbenzene, and other chemical intermediates.

Toluene

Toluene is obtained in large volumes from catalytic reforming and is coextracted with the benzene in the solvent-extraction processes. However, the maximum potential for toluene from most crude oils is double that of benzene, and toulene does not enjoy as wide a market as benzene. Two-thirds of the toluene now produced is used in aviation and premium gasoline as an octane improver, but this outlet is declining rapidly because of the advent of jet aircraft and the emphasis on regular-gasoline economy. These facts have combined to create a disposal problem for refiners and made the conversion of toluene into benzene by hydrodealkylation an attractive process as previously mentioned.

Market. Toluene consumption in chemical manufacture is the next-largest outlet after motor fuel but currently only amounts to 10% of the toluene market. This market appears to be growing and next to hydrodealkylation is the best prospect for future toluene sales. Chemicals made from toluene include benzyl chloride, benzoyl chloride, benzoic acid, toluene sulfonate and tolylene diisocyanate. Of these chemicals tolylene diisocyanate (TDI) shows the most promise since it is the standard isocyanate going into polyurethane products. Polyurethanes have application in foams, adhesives, and surface coatings. The flexible foams compete strongly with natural and synthetic latex rubber foam and has a strong price advantage on a volume basis. TDI consumption should triple by 1965.

Toluene consumption in the solvents market is almost as large as the chemical consumption and is used in rubber cement, paint, lacquer, and related products.

The development of additional processes, such as Dow's phenol-from-toluene process and Du Pont's

HAGAN X-2 . . . TRIPLE-DUTY CORROSION INHIBITOR

corrosion controller • biocide • cleaner

Hagan X-2 is a highly polar, film forming corrosion inhibitor particularly effective against hydrogen sulfide and carbon dioxide. X-2 also effectively controls many common micro-organisms, including the sulfate reducing type. As X-2 deposits a thin protective coating on metal surfaces, it removes accumulated corrosion products, cleaning water lines, valves, pumps and meters. Hagan X-2 is miscible with both fresh and salt water and is easy to feed. It may be used in producing wells, in water flood injection, salt water disposal and oil treating systems. Here are a few of the successful Hagan X-2 applications:

1 A North Texas oil producer injecting a mixture of brines had problems. Increasing corrosion and leaks forced him to use a corrosion inhibitor. He soon had trouble with the graded bed filter, and injection pressures began to climb. Study by a water consultant showed the filter media to be heavily coated with corrosion inhibitor and suspended solids. Repeated backwashing was ineffective. After replacing the filter media, the use of Hagan X-2, was begun.

Leak frequency was reduced, the filter media could be backwashed clean by normal procedures, and filter efficiency has been maintained for the past two years. The water at the input wells has remained clean and injection rates have been satisfactory.

2 In southern Oklahoma, a unit water flood operator became concerned when "black water" was noted at the injection wells of his new system. Corrosion rates measured on 30 day test specimens were between 8 to 15 mils per year. Also, large numbers of sulfate-reducing bacteria were entering the system. Corrosion had also been occurring in many producing wells.

A weekly batch feed of 5 gallons of Hagan X-2 corrosion inhibitor-biocide was begun in the most troublesome producing wells. This alleviated the corrosion problem in the wells by cleaning up the produced water.

Later complete bacterial control and 30 day corrosion coupon rates of 0.1 to 0.4 mils per year were obtained by adding Hagan X-2 at the injection plant only three times a week.

3 Many products had been tried over a period of one year to reduce acid gas and sulfate-reducing bacteria corrosion in a water flood project. Filter efficiency was drastically reduced and an inspection of the unit showed the media was fouled with iron sulfide held in a matrix of brine-insoluble corrosion inhibitor. The operator realized that there probably was similar fouling of injection sand face.

A continuous treatment with Hagan X-2 at the produced water storage tank supplemented by a slug treatment at the supply well was initiated. The operator installed wellhead filters with disposable cartridges at each injection well. The cartridges were changed frequently for three or four weeks, then, as the system was purged of deposits and debris, the frequency declined.

Successful bacterial control has now been obtained with Hagan X-2. Filter efficiency has remained high and leak frequency has been nil.

HAGAN—Your only complete source of chemical feeding equipment, water treatment chemicals, field laboratories, engineering service.

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HAGAN CENTER, PITTSBURGH 30, PA.

HAGAN OILFIELD OFFICES: Bradford, Huntington, Evansville, Little Rock, New Orleans, Tulsa, Houston, Abilene, Midland, Denver, Fort Morgan, Casper, Los Angeles. In Canada: Edmonton and Toronto.

NOW 15 to 450 GPM!

VIKING'S ENLARGED LINE OF HEAVY DUTY HELICAL GEAR DRIVEN PUMPS

Figs. 288 and 388 units with size "C" reducers, capable of handling up to 25 H.P. at 350 pump R.P.M.; 40 H.P. at 520 pump R.P.M. 20 to 450 G.P.M. capacities. Five gear ratios available, using one gear case. Six pump sizes in this series.

You now have an even larger range of Viking's helical gear driven units to fit your pumping jobs. Speed and capacity now range from 15 to 450 G.P.M. They're ideal for handling both thin and thick liquids, ranging from gasoline to molasses. Pumps equipped with packing or mechanical seals. Gear reducers independently mounted. All components can be quickly changed. Step up your delivery with these quiet, positive discharge, self-priming pumps!

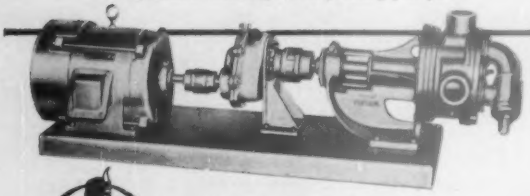

Fig. 288 units with size "B" reducers, capable of handling up to 10 H.P. at 1750 R.P.M. motor speed. 15 to 225 G.P.M. capacities. Six sets of gearing using one gear case. Six pump sizes in this series.

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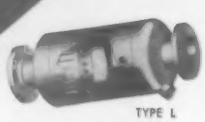
TYPE IM
Upflow Internal



TYPE L
LINE

TYPE ID
Downflow Internal

TYPE LRV
RECEIVER

Hi-eF PURIFIER

By the Manufacturers of Super-Silvertop Steam Traps

THE V.D. ANDERSON COMPANY

Division of International Basic Economy Corporation

1977 West 96th Street Cleveland 2, Ohio

caprolactam-from-toluene process, which use toluene instead of benzene may play a major role in improving the toluene sales outlook.

Ethylbenzene and Xylenes

The xylene aromatics are also produced in catalytic reformers and are being extracted by refiners and separated for chemical consumption to an increasing extent. The capacity for xylene extraction from petroleum in operation or planned is 400 million gallons per year.

Almost half of the xylene production now goes to gasoline as an octane improver and 25% goes to solvents. However, the market for the pure isomers is growing rapidly with more and more refiners separating these products for chemical sales.

Ethylbenzene. With almost half of the benzene market going to styrene manufacture, refiners are taking a closer look at ethylbenzene separation from xylene by superfractionation to compete with benzene alkylation as a styrene intermediate. Ethylbenzene from this source has a maximum potential of only 70 million gallons per year based on present xylene production and cannot replace benzene as a styrene feed stock but it should take a share of this market. Economics of ethylbenzene separation depends greatly on the concentration of ethylbenzene in the mixed aromatics, which varies from crude to crude.

Paraxylene is currently the most important of the xylene isomers. Present production of paraxylene is 180 million pounds per year with an additional 100 million pounds per year planned. It is used primarily to make terephthalic acid which is usually sold as the dimethyl terephthalate ester for the production of polyesters such as Du Pont's Dacron fiber and Mylar film. The development of a process for making terephthalic from toluene is currently arousing interest and may influence future paraxylene markets.

Orthoxylene is the second-most-important xylene and promises to become the major feed stock for phthalic anhydride now that improved catalyst and plant designs have increased orthoxylene yields above naphthalene yields. In the past, orthoxylene has been considered a poor substitute for naphtha-

lene because the yield was only half of the theoretical of 1.39 lb./lb. of feed while naphthalene yielded three-fourths of the 1.16 lb./lb. theoretical. Present orthoxylene production is only 130 million lb. per year but announced expansion will increase this to 530 million pounds per year.

Phthalic anhydride's two chief outlets are as a plasticizer for polyvinyl chloride resins and in alkyd resins for surface coatings. Phthalic anhydride shows promise as a chemical building block and is presently used to make dyes, pharmaceuticals, dielectric materials, and reinforced plastics.

Metaxylene. The most plentiful isomer, metaxylene, which makes up about 50% of the xylene isomer mixture, is the least useful. Metaxylene is used to make isophthalic acid which competes with phthalic for reinforced plastic and plasticizer market. One refiner separates metaxylene for isophthalic acid production and another produces isophthalic from mixed xylene feed along with terephthalic and phthalic acids. The chief use of metaxylene is for solvent and gasoline blending after the more valuable xylenes have been extracted.

Naphthalene

The hydrodealkylation process, in addition to its influence on the benzene-toluene market, is now threatening the coal-tar industry's dominance of the naphthalene market. Capacity of 325 million pounds per year of naphthalene via the hydrodealkylation route has been announced and more plants are expected. With the coal-tar industry's expected naphthalene production pegged at 500 million pound per year, 1962 may see petroleum-derived naphthalenes becoming the major source of supply for this important aromatic chemical. Catalytic cracker recycle stocks show promise as a low-cost, readily available hydrodealkylation feed stock of almost unlimited quantities (over 10 billion pounds per year potential).

Naphthalene, like orthoxylene, is closely tied to the phthalic anhydride industry with three-fourths of all naphthalene going to phthalic manufacture. Phthalic manufacturers have been hard pressed to meet their phthalic demand because of a naphthalene shortage, resulting from low steel-production rates. They have substituted orthoxylene even though yields are lower in naphthalene-designed plants and have imported large quantities of naphthalene. This situation has created a vast petroleum naphthalene market and refiners are rushing to build hydrodealkylation capacity. Petroleum-naphthalene's high purity has provided an unexpected bonus in higher phthalic yields, making petroleum naphthalene a much sought after chemical. Dependability of supply is another factor that has helped petroleum naphthalene sales.

One dark spot on the horizon is orthoxylene's invasion of the phthalic anhydride market where it appears to be the favored feed stock for new plants. Offsetting this, however, are the existing phthalic facilities which cannot use orthoxylene, plus the developing market for a new generation of naphthalene derivatives which should expand rapidly now that a steady supply of cheap, pure naphthalene is available.

Summary

Aromatic chemicals from petroleum sources now represent the major source of supply for benzene, toluene, and xylene chemicals. Naphthalene is one of the few aromatics still dominated by the coal-tar industry. However, the hydrodealkylation processes threaten to shift the major source of naphthalene to petroleum before the end of 1962.

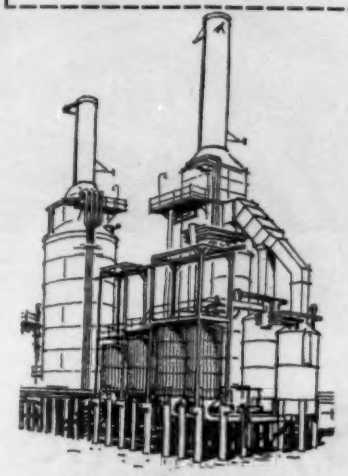
Benzene leads the aromatics field in volume and value. Toluene continues to be the poor relation in the aromatics family, whose chief value is feed stock for benzene production and sales as a solvent or gasoline blending stock.

Interest in separating xylenes for chemical sales is mounting with orthoxylene production capacity skyrocketing to reflect its emergence as a favored phthalic anhydride feed stock. Recovery of paraxylene and ethylbenzene from mixed xylene should increase.

The development of dependable, high-quality, low-price petroleum aromatic chemicals has encouraged the rapid development of many new aromatic products. There is every reason to expect this market to continue to grow and expand.

on stream in the United States

ANOTHER HOUDRIFORMER



Tenneco Oil Company
Chalmette, Louisiana

Joining the growing list of refiners who have chosen a Houdry process for economy and flexibility is Tenneco Oil Company. Its recently completed HOUDRIFORMER has a nominal design capacity of 6,000 BPSD.

The installation is now producing a high yield of aromatics, employing Houdry 3-G Platinum Reforming Catalyst. This HOUDRIFORMER can also be used to upgrade naphthas into ultra-high octane motor fuel.

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CIS-POLYBUTADIENE, in resilience, rebound, and hysteresis properties, at least equals natural rubber, and is far superior to SBR rubber. This material is presently being made in commercial quantities only at Phillips Chemical Co.'s Borger, Tex., plant shown above.

Synthetic rubber—

petrochemical giant—and still growing

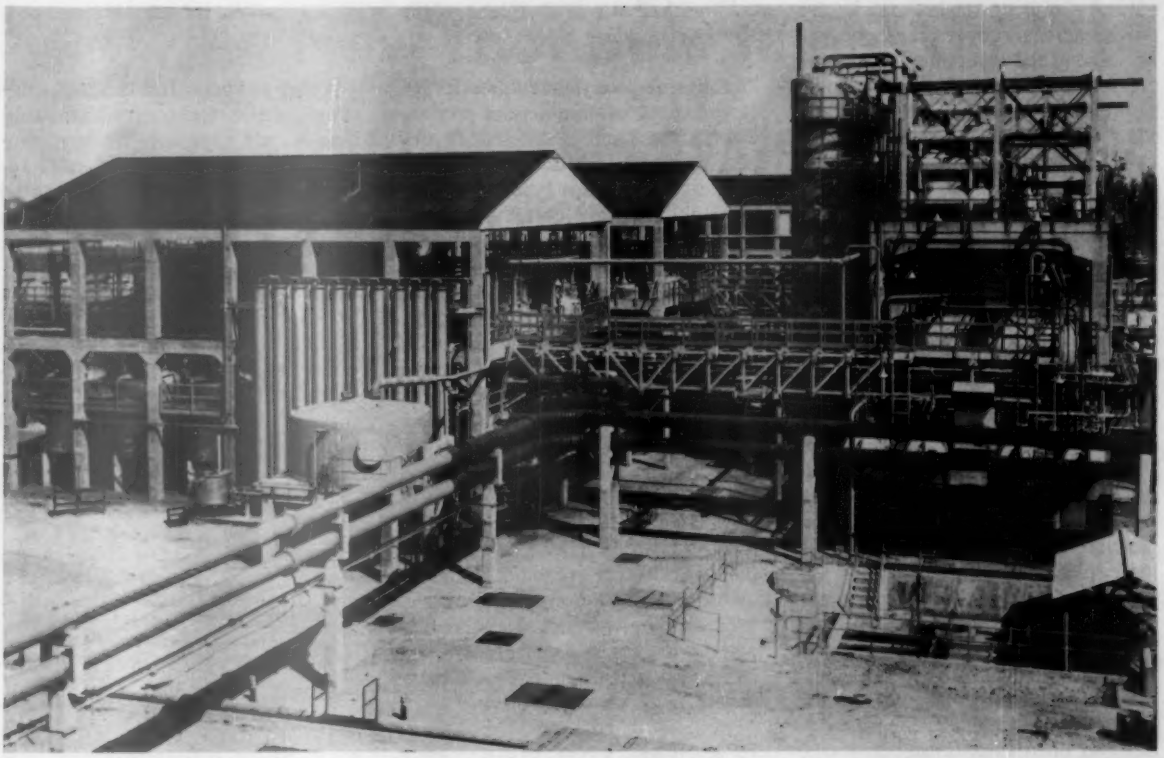
THE synthetic-rubber industry, an important and substantial member of the petrochemicals family, is headed toward continued growth and expansion in the years ahead. Exciting new synthetic rubbers are continually appearing on the scene in this industry and, in 1960, two of these completely new polymers, cis - polyisoprene (Shell Chemical Co.)[1] and Cis-4* polybutadiene (Phillips Chemical Co.)[2] achieved commercial production. Production of a third polymer, Diene* polybutadiene (Firestone Tire & Rubber Co.), was started in March 1961.[2] Other new developments and continued modifications of existing synthetics promise to provide a kaleidoscope of change and improvement in rubbers of commerce for the tire industry, mechanical goods, shoe soles, wire and cable, and other segments of the rubber industry.

*A trademark.

Styrene-butadiene rubber (SBR). Trends in SBR developments established over the past 3-4 years continue in 1961. These trends include growth in the use of black masterbatch and increasing production of oil-black masterbatches[3] Black-masterbatch techniques have been applied to practically all of the carbon blacks used in the rubber industry. The more reinforcing types, ISAF and SAF, appear to be increasing in popularity due to improved tire-tread performance obtained with these blacks. GPF and SRF masterbatches have been produced in lesser quantities for mechanical goods and other uses.

In 1960, the total of all masterbatch production was reported to be 686,500 gross long tons.[4] This represents about 44% of the total SBR production on a net rubber basis. More than 1,100,000 bbl. of extender oil were consumed in producing masterbatched rubber—a substantial outlet for these petroleum products.

Polybutadiene. Of the hundreds of diene-based polymers synthesized in the last 20 years, none has aroused as much widespread interest as cis-polybutadiene. Since early 1956, when the synthesis of this new "stereo" rubber was announced by Phillips Petroleum Co., a steadily increasing number of companies throughout the world have focused their research efforts on this polymer. Today, a scant 5 years later, Phillips is manufacturing its Cis-4 polybutadiene in a 25,000-long-ton-



SBR CONTINUES TO DOMINATE the synthetic-rubber field with increasing popularity of oil-black masterbatches. Shell Chemical Co. produces SBR at this plant at Torrance, Calif.

per-year plant at Borger, Tex.,[2] and several other companies are building plants which are scheduled for completion late in 1961 or in 1962. World-wide production capacity for cis-polybutadiene is expected to exceed 250,000 long tons per year in 1963.

The widespread commercial interest in cis-polybutadiene arises from its performance in carbon-black reinforced vulcanizates. In resilience, rebound, and hysteresis properties, it at least equals natural rubber, and it is far superior to SBR rubber. These properties coupled with its outstanding abrasion resistance have led to its rapid acceptance as a replacement for natural rubber in heavy-duty truck tires. Under normal driving conditions cis-polybutadiene treads give as much as 50 to 60% greater mileage than natural rubber, and under severe-wear conditions, one cis-polybutadiene tire will outlast two natural-rubber tires.

While the Phillips plant is the only full-scale cis-polybutadiene plant in the United States on stream at present, Goodyear Tire & Rubber Co., American Rubber & Chemical Co., and Goodrich-Gulf Chemicals, Inc., expect to complete their plants late this year.[2] Shell Chemical Co., Texas-U. S. Chemical Co., Inc., and several foreign companies have also expressed interest in cis-polybutadiene.

A second type of polybutadiene rubber, containing about 40% cis content, was commercialized by Firestone in 1961 under the trade name, Diene.[2] This rubber is manufactured in a 30,000-long-ton per year plant at Orange, Tex. Firestone recommends its Diene rubber as a blending stock for use in modifying the properties of SBR and natural rubber.

In spite of their brief history, the new polybutadiene rubbers appear to be firmly established in the family of synthetic rubbers required by industry. Their growth can be expected to provide additional outlets for butadiene, processing oils, and carbon blacks.

Polyisoprene. Shell Chemical Co. has been producing cis-polyisoprene, so-called synthetic natural rubber, at its Torrance, Calif., plant since 1959. Current production capacity in these facilities exceeds 18,000 tons per year. Capacity will be increased to 60,000 tons per year when Shell completes its new polyisoprene plant at Marietta, Ohio, in 1962.[1] Goodyear also has a 20,000-ton per year cis-polyisoprene plant under construction in Beaumont, Tex.

Shell polyisoprene is being marketed both as a nonpigmented rubber and as an oil-masterbatch, and it is expected to be available soon in latex form. All three of these forms are recommended as direct replacements for natural rubber. It appears that the major market for cis-polyisoprene lies in applications which require high product purity and uniformity and excellent color characteristics, in which the synthetic polymer is reported to be superior to the natural product.

The future market for synthetic cis-polyisoprene is uncertain. The optimistic forecasts made a few years ago at a time when natural-rubber prices were in the range of 40 to 50 cents per pound, have been replaced by a rather conservative outlook now that prices have dropped and adequate supplies of natural rubber exist. The synthetic-natural-rubber picture has been still further weakened by inroads in the

natural-rubber market made by polybutadiene rubbers; consequently, some of the companies which expressed a firm interest in cis-polyisoprene a few years ago have adopted a wait-and-see attitude, or have switched to cis-polybutadiene. Barring drastic political upheavals in the natural-rubber producing regions or a major war, there is little reason to expect a change in this picture in the next few years.

Butyl rubber. In addition to the well-established uses for butyl rubber for inner tubes and in the wire and cable industry, interest continues in butyl rubber tires for soft ride and freedom from noise. Despite the higher cost of butyl tires due to small volume and fabrication problems, their use appears to be increasing. Butyl production in 1960 was 98,000 long tons compared to 81,200 long tons in 1959 and 66,900 long tons in 1957. Butyl latex, a comparatively recent addition to the industry, is suggested for use in coatings, adhesives and cord-dip and thus helps further to insure the market for isobutylene — the butylene building block.

Ethylene-propylene rubber (EPR). Despite lack of commercial production in the United States, EP rubbers continue to attract the interest of the rubber industry for two reasons: potential low cost,[5] and resistance to aging and ozone.[6] Although commercial production has begun in Europe, EPR is not yet generally available. EPR is also under development by several companies in the U. S. One of the disadvantages of EPR has been the requirement for nonsulfur curing systems because of the complete saturation of the raw rubber. Recent advances in EPR technology have led to a sulfur-vulcanizable rubber, according to reports from at least two companies working in the field. This development may stimulate interest in EPR and we can look for increased activity to exploit applications where sulfur vulcanization is almost mandatory (such as tire treads).

Successful commercialization of EPR rubber could provide additional markets for ethylene and propylene.

Other rubbers. Individually, neoprene, nitrile, and polyurethane rubbers do not approach the huge production scale of SBR, but taken together they represent a substantial consumption of petrochemicals. The basic raw materials for neoprene manufacture are acetylene and hydrogen chloride; butadiene and acrylonitrile are used to make nitrile rubber; and propylene oxide is a major building block for polyurethanes. Total production of these three rubbers exceeded 225,000 long tons in 1960.

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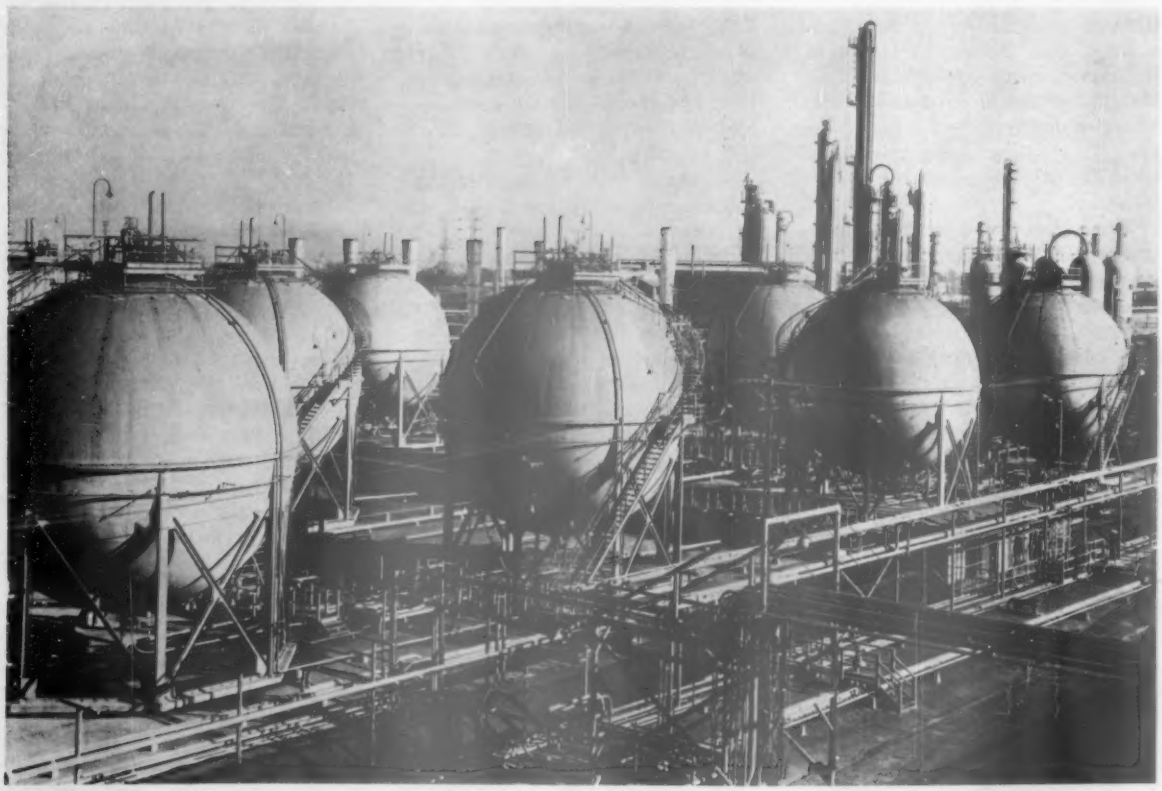
3. Crouch and Tucker, Ref. Engr., Nov. 1959.
4. U. S. Dept. of Commerce, Current Industrial Report M30A (60)-13, May 24, 1961.
5. Weyermuller, Chem. Processing, 24, No. 5, p. 23 (May 1961).
6. Amberg and Robinson, Ind. Eng. Chem., 53, 368 (May 1961).



CIS-POLYISOPRENE is made by Shell Chemical Co. at its Torrance, Calif., plant above. This synthetic "natural" rubber is recommended as a direct replacement for natural rubber, but with present low prices and adequate supplies of the natural product, polyisoprene's future is a little uncertain.

New tool puts finger on faulty crude-tower distillation

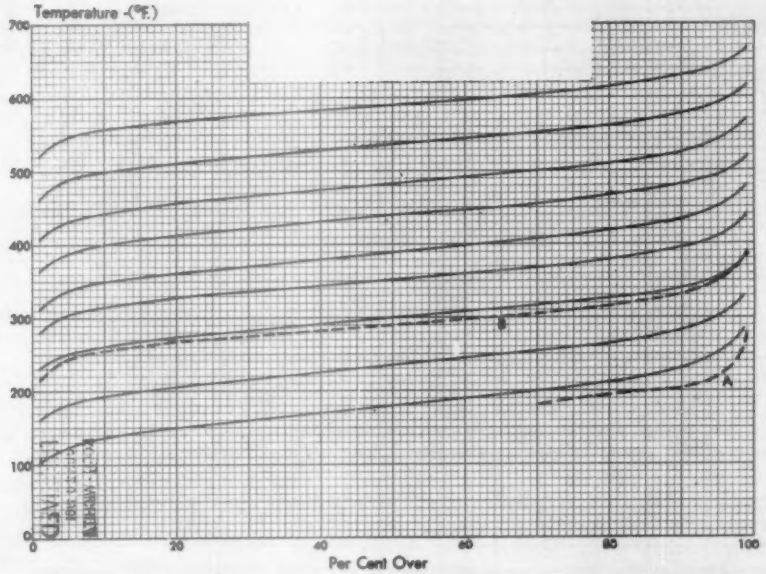
Probability chart helps pinpoint the cause of trouble

BY G. C. THRIFT
Koch Engineering Co., Inc.,
Wichita, Kans.

MOST STARTUP operators and trouble shooters have accumulated a morgue of typical operating data and product tests. Invariably this morgue contains numerous ASTM distillation curves of products from familiar, well-designed, and well-operated units.

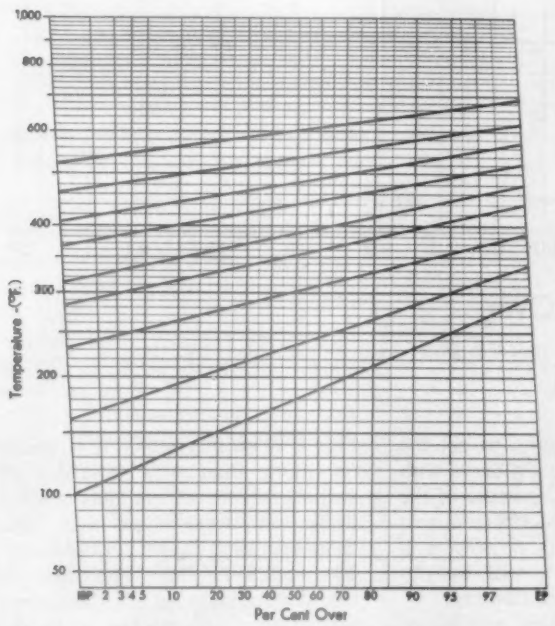
Many have those ASTM's idealized and plotted similar to those in Fig. 1. By using these plotted ASTM's as "par" and superimposing the plots of ASTM's from problem units, much can be gained by comparing the character or curve shapes of the two sets of ASTM's.

Such a superimposition is shown

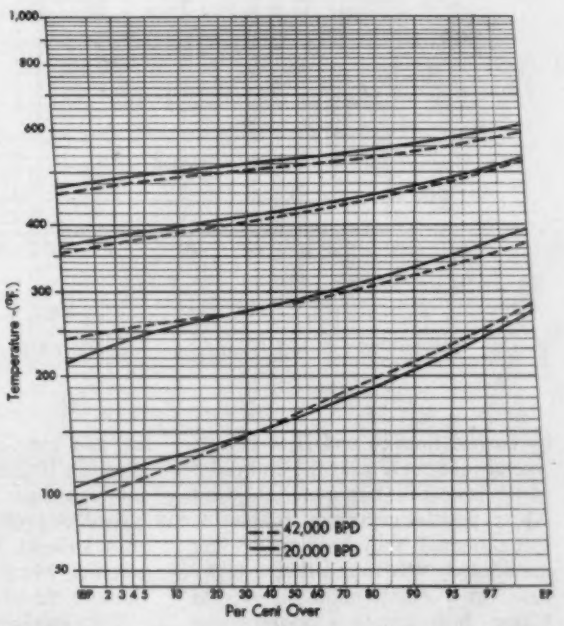


SUPERIMPOSING DISTILLATION CURVES from a problem unit over ideal distillation curves helps the operator to analyze the trouble. Fig. 1.

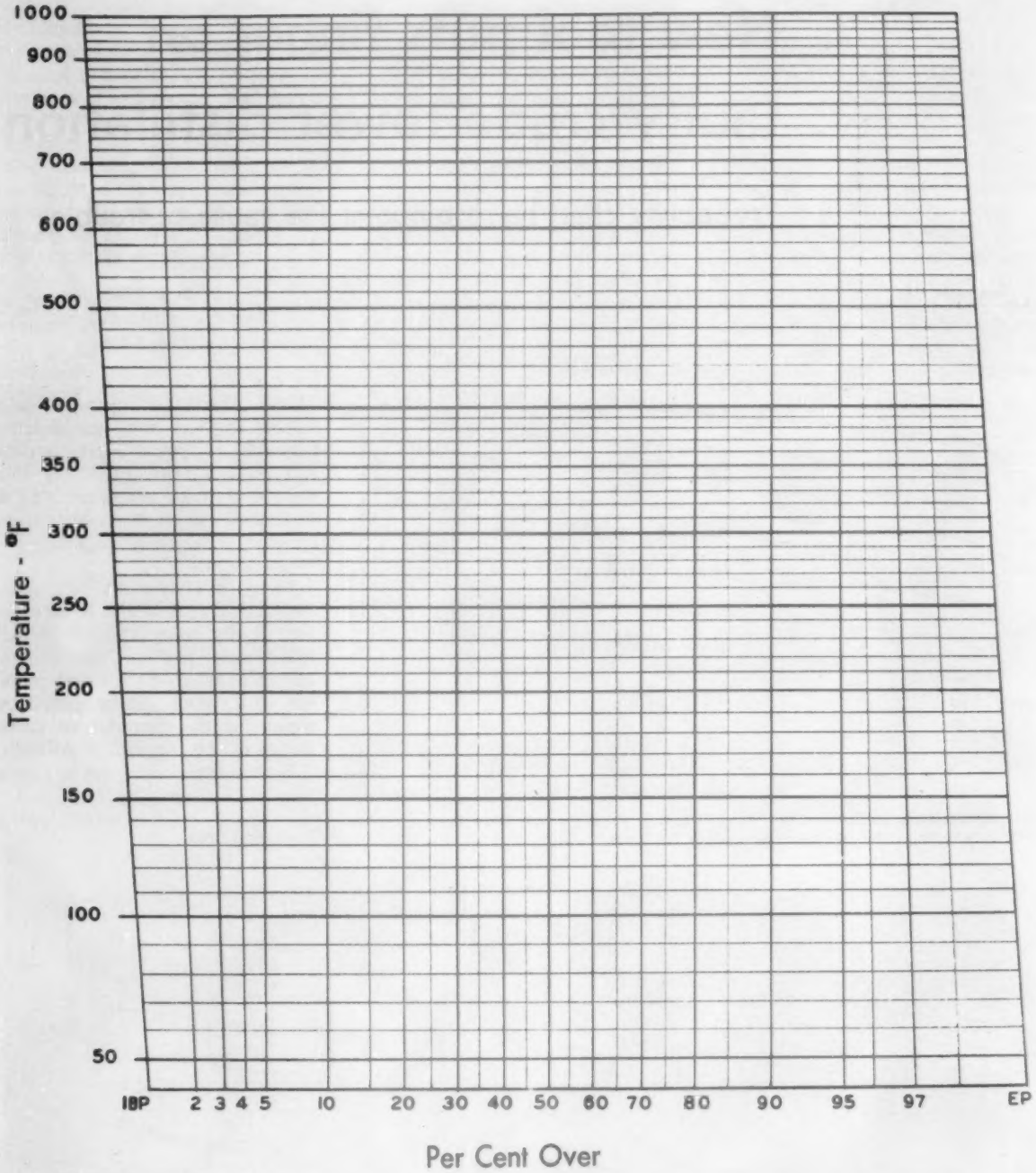
A paper presented to WPRA, Wichita, Kans., May 1961.



NOTE THAT ALL of the ASTM's plotted here are straight lines. These are the same idealized ASTM's that show up as curves in Fig. 1. Fig. 3.



IDENTICAL OPERATING conditions produced naphthas of different boiling ranges. Inspection showed installation errors in the tower zone. Fig. 4.



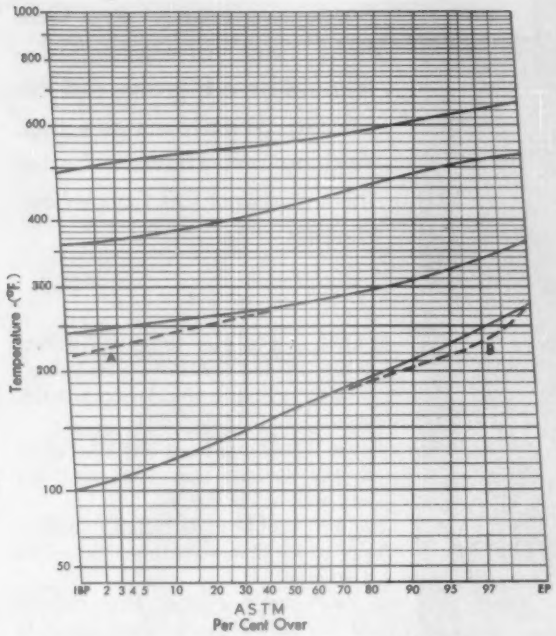
PROBABILITY CHART is based on over 100 ASTM's of stripped products from well-designed units. Fig. 2.

by dashed lines A and B in Fig. 1. The abrupt curve near the end point of the lowest-boiling material (point A) is positive evidence that it is contaminated with heavier - boiling material. It was found that a leaky valve in a pump manifold was to blame. B is simply a poorer-than-average fractionated product.

Considerable experience is helpful, and even necessary, to get the most out of comparing a curve with a straight line. The departure of the "sport" or problem ASTM from par, or a straight line, is obvious and graphic. Much more will be obvious to the untrained observer.

With empirical scales, ASTM's of stripped crude-unit products can be plotted as essentially straight lines. Fig. 2 is such a scale. It is based on more than 100 ASTM's of stripped products from units of good design and well within their efficient operating range. Similar methods were used many years ago on the development of the viscosity-temperature relationship chart for petroleum oils.

Fig. 3 includes the same idealized



LINE A reveals an overstripped naphtha. Line B shows a contaminated gasoline. Fig. 5.

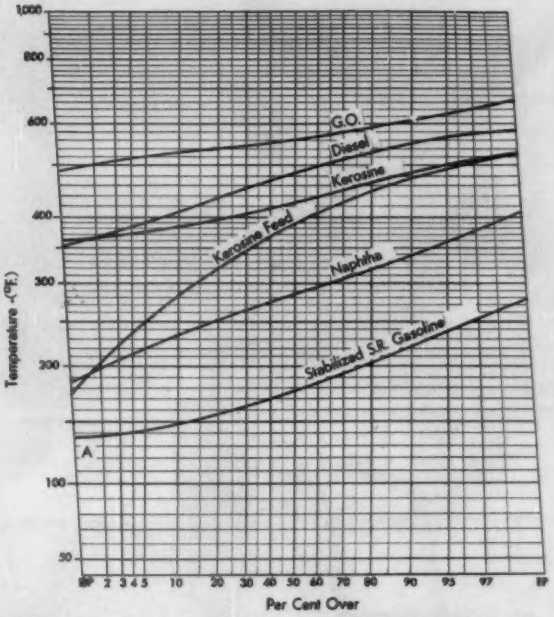


CHART SHOWS a straightrun naphtha stabilized to lower-than-average vapor pressure (point A). Fig. 6.

ASTM's as are plotted in Fig. 1. Note that all of the ASTM's plot as straight lines.

Typical uses of the probability chart are shown in Figs. 4 to 7.

By preparing such a chart as Fig. 3 for each new unit, on each typical duty, any subsequent tray damage or efficiency deterioration can be readily spotted. Experience with the chart will teach the analyst or operator a great deal.

Here are some general observations and what they mean:

Curved down near i.b.p. = poor stripping.

Curved up near i.b.p. = overstripping.

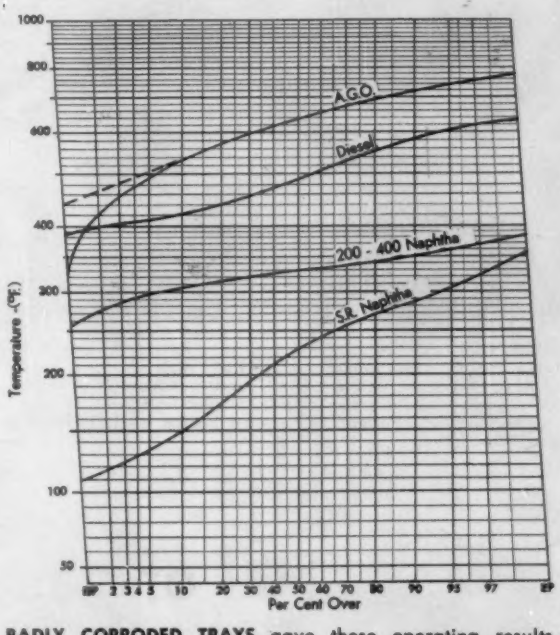
Curved up near e.b.p. = contamination or entrainment.

Curved down near e.b.p. = contamination or abnormal fractionation or stripping of next higher boiling cut.

Lines with greater slope than normal = generally poorer fractionation.

Lines with lesser slope than normal = abnormally good fractionation.

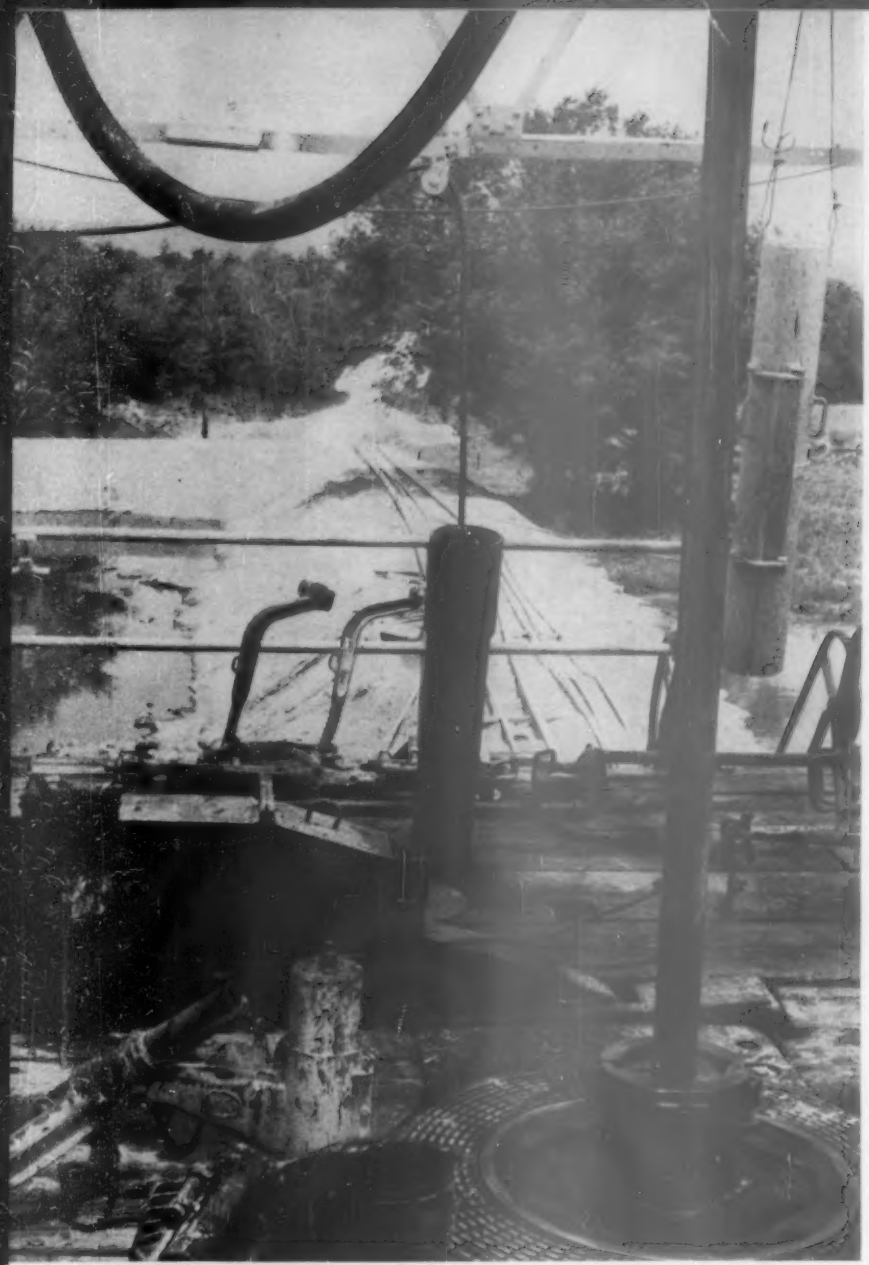
While this chart is meant for crude distillation alone, it will assist in other relatively wide-boiling-range product evaluations.



BADLY CORRODED TRAYS gave these operating results. The gas oil was unstripped in this case. Note the abnormal character of the lines. These "galloping" ASTM's frequently result on manual equipment and should be checked before analysis. Fig. 7.

Acknowledgment

The writer thanks Koch Engineering Co., Inc., for permission to publish these data.



ACROSS DERRICK FLOOR can be seen the mud pits, left, and various lines leading to the gas flare. Wells in Red Oak field use both mud and gas as drilling fluid, depending on the formation being drilled, and general condition of the hole. One of the lines leading to flare carries gas to pilot light, another handles return gas from annulus, and the remainder are connected to manifolds for venting various parts of the system.

ARKOMA BASIN . . . Full of gas —and headaches for drillers

Productive area of Red Oak field is not yet established—it could be a big one. But the drilling problems are big. And no one knows it better than Midwest Oil Corp.'s engineers.

BY W. B. BLEAKLEY
Production Editor

"ONE OF THE toughest drilling areas in the country," is what they're saying in the Arkoma basin, around Red Oak, Okla.

- There's a hard sand so close to the surface that you can't get any weight on the bit.
- There's a depleted, shallow gas sand that sometimes acts like a sponge.
- There's a thick shale in the Atoka series that's often hard to drill.
- There's a fault zone with the sands dipping almost vertically, and a small increase in bit weight may deviate the hole as much as 3° in less than 100 ft.

These are some of the problems faced by Midwest Oil Corp. and other operators in and around Latimer and LeFlore counties, Oklahoma.

Productive sands. Drilling objectives in Red Oak field are the Red Oak sand and the Spiro. Both produce dry gas.

Depth to the Red Oak is about 7,500 ft., and to the Spiro about 11,500 ft.

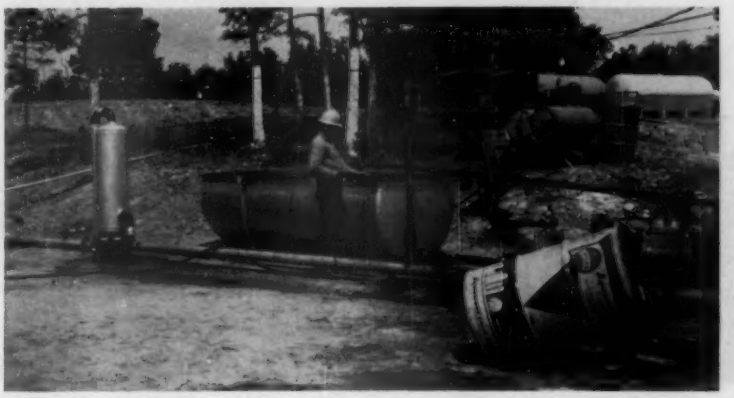
The Hartshorne sand is an old producing horizon that is depleted in this area. It is found at about 1,700 ft., and was once a good gas producer.

There have been other shows in the field, but none of commercial value.

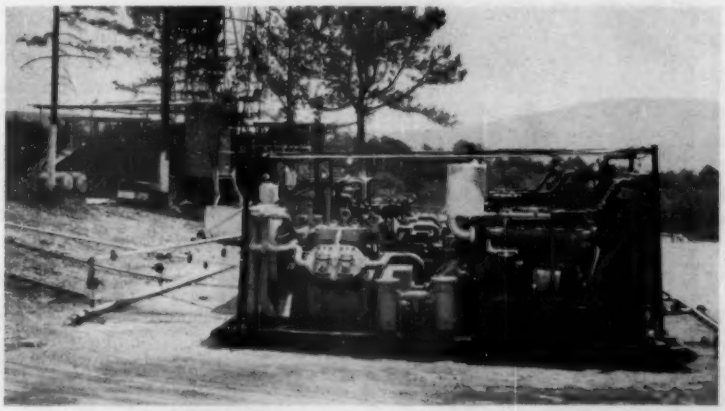
Both the Red Oak and the Spiro are part of the thick Atoka formation which extends from the base of the Hartshorne through the Spiro, a vertical distance of about 10,000 ft. The Red Oak sand is the top of the middle Atoka.

Discovery well. Deep Atoka gas was discovered by the drilling of Midwest Oil Corp. 1 Orr in 8-6n-22e. The well was located high on the structure according to contours

What other operators are doing in Red Oak field



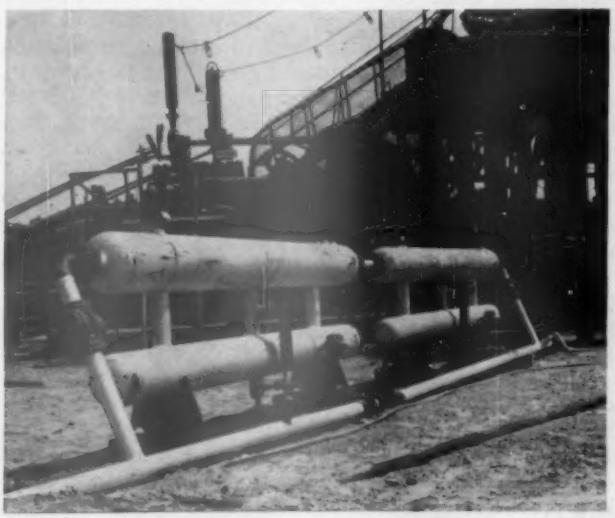
FOAMING AGENT is sometimes needed while drilling in Red Oak field when water is found in formation being drilled. Foaming agent-water mixture is being prepared in this tank as operator is preparing to switch from dry air to mist drilling.



COMPRESSORS are needed on some locations if a supply of high-pressure gas is not available. This battery of compressors is boosting gas pressure and supplying Fleet Drilling Co. rig on location at Republic Natural Gas Co.'s 1 Lowery.

Photos by Carl Hoot, of the Journal staff.

DRY GAS is needed when drilling through the Atoka shale because it balls and sloughs badly when wet. These free-water knockouts are used to remove traces of water on the downstream side of the compressors in the photo.



ROTATING HEAD is part of equipment used in drilling wells under pressure, as with air or gas. Rubber packer element at bottom seals off annulus above blowout preventers, and diverts exhaust gas into flare line.

ORIFICE METER and pressure regulator (circled) are on the line bringing gas for gas drilling operations to Big Chief Rig 5, on Midwest Oil Corp.'s 1 Coblentz. Gas goes through a trap, located behind LPG tank, and then to the rig. Gas has been previously dried at the producing well, and if mist drilling is desired, water can be added at the rig. In extreme left background can be seen the flare from exhaust gas as it is returned to the surface.

on the shallow Hartshorne. Position with respect to deeper production will not be definitely known until development is completed.

Well topped the shallow Booch sandstone at 490 ft., the Hartshorne at 1,540 ft., and went into the Atoka shale at 1,780 ft. Approximately 700 ft. of Atoka shale was repeated because of thrust faulting in the area.

Use all methods. Because of the varied nature of the drilling problems in the area, practically every conceivable way of drilling a well has been tried in the wells drilled so far. Conventional rotary, with gas and with mud, cable tools, and the hammer drill have all been used.

Conventional rotary has been used from the surface, and 16-in. conductor pipe at about 200 ft. has been pretty well adopted as standard.

Trouble starts soon after. The shallow Booch sand is very hard, and is so close to the surface that drill string weight is still low—too low to get enough weight on the bit for fast drilling.

Because rotary drilling was so slow, cable tools were tried through the Hartshorne. Sand was penetrated, but the hole contained many dog legs and was not felt to be good enough when drilling was to be continued an additional 10,000 ft.

On the 1 Orr, rotary with mist was used in drilling through the Booch sand. Time to get through the 100-ft. thickness was about 5 days.

On an offset well, 1 Foster, a hammer drill with mist was used, and in 14½ hours the bit had gone through the Booch and beyond, a total of 172 ft. Only one bit was used, and field engineers reported it to be only slightly dull. Tool used was a 6¾-in. Mission hammer drill, and penetration rate averaged about 10 ft. per hour of operation. Rotary rate with mist was about 2 ft. per hour.

Other problems. Drilling of the Booch sand is just one of the expensive problems in Red Oak field. Solutions to this and other problems are responsible for the drilling program that Midwest has decided to use.

At present wells are drilled through the Booch and the Hartshorne with a 9-in. hammer drill below 175 ft. of conductor pipe, using gas as the drilling fluid. Gas is taken from wells already completed in the field. Mist drilling will be used if small amounts of water are encountered.

Drill string above the hammer contains about four 9¾-in. collars and eight 8-in. collars, with stabilizers.

Drilling continues to a point about 100 ft. into the Atoka shale, and 10¾-in. 51-lb. J-55 casing is run. When casing is in place, hole will be loaded with fluid, and the pipe cemented to the surface. Purpose of the heavy pipe and the cement to the surface is to resist wear during future drilling operations.

Drilling fluid through the Hartshorne is gas or air because lost circulation is a problem with mud in the hole. The Hartshorne is an old, depleted gas sand, with very low reservoir pressure, and is a real thief zone with mud in the hole. So Midwest has used gas through that zone to eliminate the circulation problem.

After unloading the hole, drilling with gas is resumed, with a 9¾-in. rock bit, generally; a bottom hole reamer; two 8-in. drill collars; ten 6¾ in. drill collars, and stabilizers at 35 and 95 ft. off bottom.

At this point in the 1 Maxey, phenomenal bit performance was observed, and a record in the area believed established. One bit was used to drill 3,786 ft. in 139 rotating hours.

Gas drilling continues to a point a short distance into the Red Oak sand. At this point hole may be loaded with mud, and the Red Oak cored. Or, if gas production is not great enough to be hazardous or cause extreme hole erosion, drilling may be continued with gas.

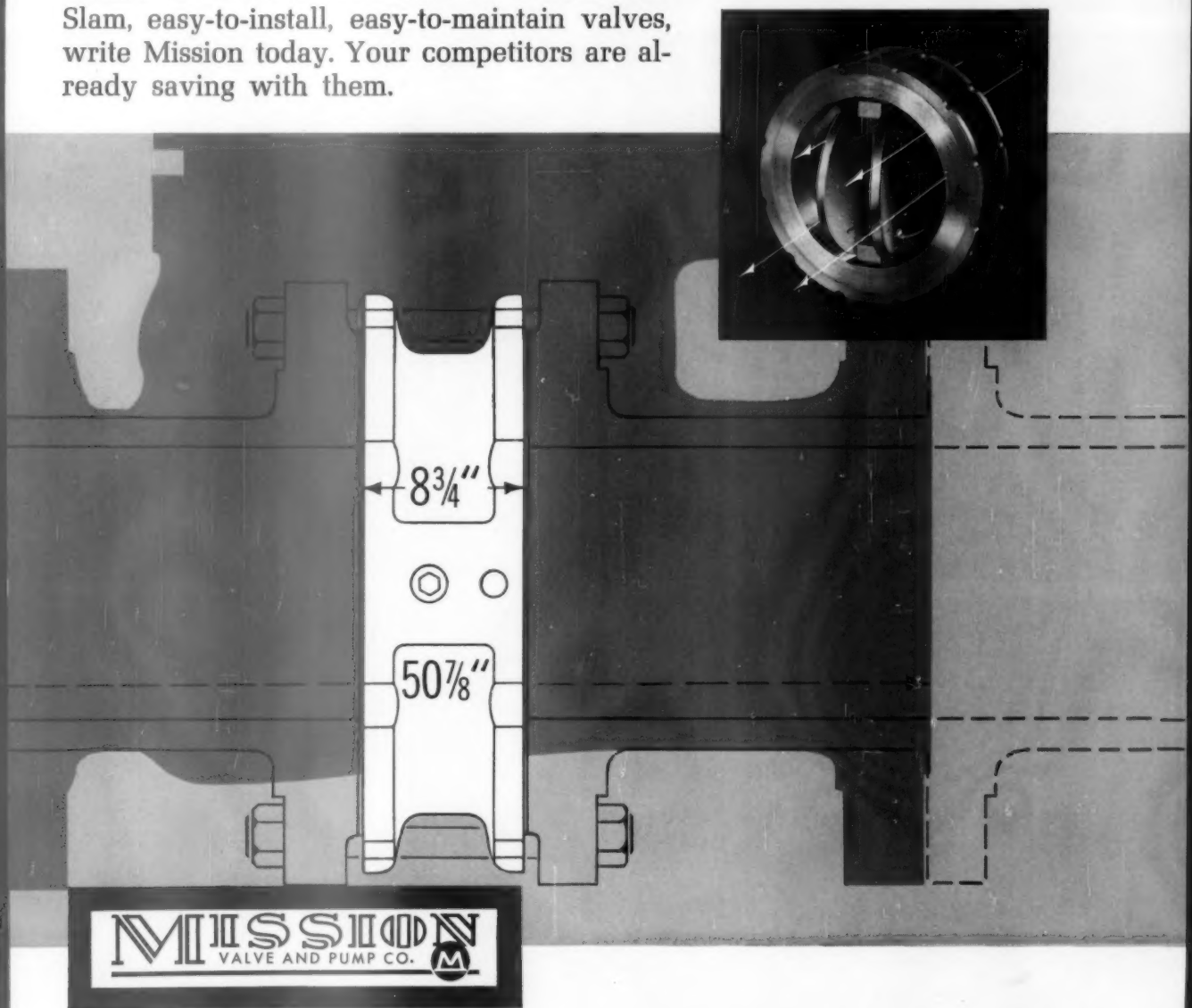
Mudding up is necessary if coring or special logs are desired because the Red Oak erodes badly when gas is used as the drilling fluid, and well logs have not given good quantitative information. So mud is used to prevent erosion, and the sand is cored to get the needed reservoir data.

Erosion in some cases has been so bad that the hole diameter exceeded the maximum reading on a caliper log, and it was impossible to tell how big the hole actually was. This made completion very difficult, because the volume of cement needed could not be calculated with accuracy, and the perforating

The illustration compares a 10-inch Duo-Chek Check Valve with a conventional check valve. In one application a 10-inch, Series 2500, Duo-Chek, which meets all ASA strength and design requirements except face-to-face size, is in continuous operation on a reciprocating compressor discharge line. A conventional swing check in this service would weigh over 5,000 pounds. The Duo-Chek weighs 285 pounds.

Here are some more quick facts: Available in sizes from 2 to 48 inches, ASA series 125 through 2500, in steel, stainless, aluminum, and bronze. Corrosion and heat resistant seals available. To find out more about these NO-Slam, easy-to-install, easy-to-maintain valves, write Mission today. Your competitors are already saving with them.

Mission Duo-Chek weighs less than 10% as much



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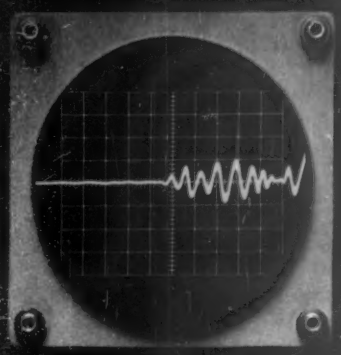
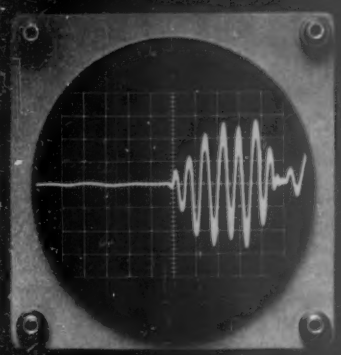
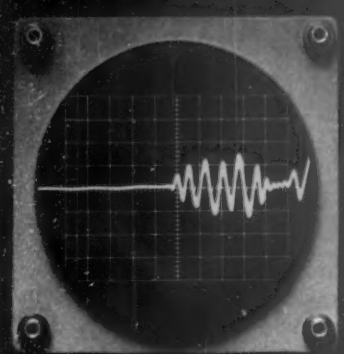


INTERVAL A — Heavily-fractured formation results in very low formation signal amplitude.



INTERVAL B — Unfractured formation results in normal signal amplitude.



INTERVAL C — Partially - fractured formation results in lower-than-normal formation signal amplitude.

WELEX FIRST AGAIN!

New Frac Finder locates best completion interval

The three intervals at left show different degrees of natural fracturing in the same limestone structure. Is there any question which interval you would select for completion?

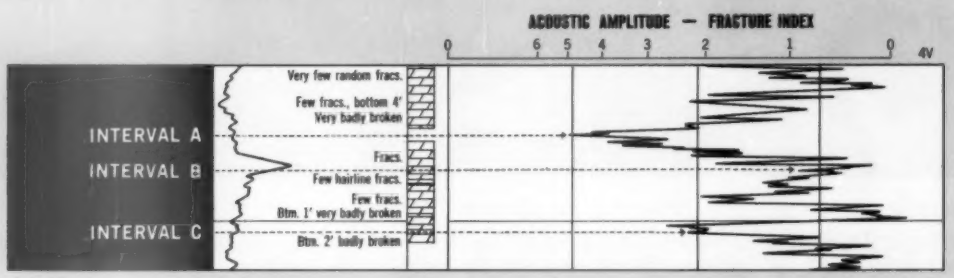
The heavily-fractured interval promises to be a star performer even though the matrix porosity and permeability may be low. But the non-fractured interval, though it's on structure, may not even make a well. This means that an accurate method is essential for determining if the fractures are open. So the only question is—**How do you find the most heavily fractured interval?**

The Welex Fracture Finder, with a direct-reading Fracture Index printed right on the log, does it simply with a single curve. The Fracture Finder (or Acoustic Amplitude Log) directly measures the formation signal amplitude, accurately locating all open natural fractures within perforating range of the well bore.

The Fracture Index is based on engineering data obtained by Welex in a full-size test pit containing natural limestone blocks. It gives an easily read quantitative measure of the degree of fracturing in each zone.

In the past, cycle skipping on acoustic velocity logs sometimes has been used in an attempt to find fractures. The Welex Fracture Finder, with its Fracture Index, makes this "trial and error" method of fracture location obsolete.

The Fracture Finder shows both vertical and horizontal fractures and gives you a complete picture on the first trip



—showing plainly where the fractures are and **the degree of fracturing.**

In fractured formations the Fracture Finder measures the reduction in the amplitude of the acoustic signal caused by reflections of energy at any interface where there is a large density change. At such interfaces a portion of the signal is reflected and a lesser amount reaches the receiver than if the fractures were not present.

On your next well, call Welex. The Welex Fracture Finder Acoustic Amplitude Log is fully tested, field proved and ready to work for you.

COMPLETE WIRELINE Welex SERVICES

WELEX

A Division of Halliburton Company

General Offices: 1728 Old Spanish Trail, Houston, Texas

ENGINEERS AND CONSTRUCTORS FOR INDUSTRY

Central America's First Oil Refinery Is Largest Prefab Oil Refinery Ever Built

The largest skid mounted oil refinery ever constructed has just been installed near Puerto Matias de Galvez, Guatemala, for the Breaux Bridge Oil Refining Company, Inc.

This 4,000 barrel-per-day refinery was designed by the Houston office of The Lummus Company to meet an unusual set of conditions in the rain forests of Central America.

Because of a shortage of labor in the area, Lummus found it impossible to follow its usual practice of employing local craftsmen. In addition, an average of 190 inches of rainfall per year pointed to excessive difficulties in on-site construction. These conditions, coupled with the relatively small size of the process units, suggested the use of prefabricated refinery units that could be built in the United States and shipped to Guatemala.

The refinery consists of atmospheric distillation, naphtha desulphurizing, and catalytic reforming processing units, together with the necessary supporting offsite facilities.

Lummus evolved the plan of mounting pumps, compressors, exchangers, accumulators, etc., for the various process units on steel skids. Large vertical process towers, due to shipping limitations, could not be skid-mounted.

The plant was carefully designed so that when assembled and completed it could be easily operated and maintained. The design resulted in the use of seven process equipment skids—four are pictured above—plus two compressor skids.

Prefabricating and prepackaging techniques were also used in the design and transporting of heaters, boilers, electric generation equipment, water system pumps, and even refinery personnel housing.

Lummus felt that this design concept had many advantages. Design, procurement, and construction schedules could be overlapped to a much greater extent than usual, resulting in a shorter completion schedule and many economies. Also, better quality control could be maintained. Construction was completed in 10 months after clearing of the dense jungle jobsite. It is estimated that the same refinery, constructed by conventional means, would have taken about 15% longer, and because of the necessity of importing craftsmen for the distant jobsite, it would have cost about 10% more.

The portable plant technique is one that Lummus knows well. Ten years ago, the company built a similar, but smaller, skid-mounted portable refinery for the U. S. Navy. Lummus has also designed and constructed transportable pilot plants for the Wulff acetylene process, a refinery pilot plant, an atomic reactor test loop, and a nitrous oxide unit among others.

If you have a construction problem which might be solved through this technique, Lummus would be pleased to discuss it with you.

THE LUMMUS COMPANY, 385 Madison Avenue, New York 17, New York, Houston, Washington, D. C., Montreal, London, Paris, The Hague, Madrid; Engineering Development Center: Newark, N. J.

tool had to penetrate a great distance.

The sands cannot be cored successfully with gas. This has been tried, and recovery amounted to less than one-third of the drilled section.

Practice has been to drill about 300-500 ft. below Red Oak and set a 7⅝-in. intermediate string. There were two reasons for this procedure: (1) to protect the Red Oak, which is sensitive to mud filtrate, and (2) to permit the return to gas drilling. There is question about the feasibility of this, as reducing hole by running intermediate casing causes many drilling problems.

Gas is used to the top of the Spiro, if possible, and into it a short distance. Procedure has been the same as in the Red Oak; mud up, core through, and complete.

Experience costly. This procedure is expected to lessen drilling and completion time.

Only one well was drilled through the surface with mud, and that one cost $42,000 in lost circulation alone.

But Midwest has gained valuable experience with gas drilling, and with the hammer drill.

According to Tom Ball, Midwest's drilling and production engineer in the area, gas drilling is far superior to mud—when everything is going all right. But don't fight trouble with an empty hole. His advice—in case of trouble; mud up immediately, and use a low-water-loss mud. Fishing operations have been unsuccessful with gas in the hole, and at least one well has been sidetracked because the fish could not be recovered. The exact point at which to switch over to mud is a matter of experience, however. A few hours might be too long, Ball says.

One other thing that makes gas drilling so attractive in the area is the absence of a good high-temperature mud that has stable properties at high viscosity which is needed when shale sloughs into hole. Bottom-hole temperatures are abnormally high in the field, causing dehydration of the mud. At 11,500 ft., a temperature of 270° F. has been recorded.

Up to 11.5-lb. mud is required when drilling the Red Oak because of formation pressure. Viscosity ordinarily is from 60-120 seconds, higher when in trouble with shale sloughing, with a water loss of 2.0 cc.

In the Spiro, mud weight need be only 10.0 lb., with a viscosity of 120-150 seconds, and water loss the same as in the Red Oak.

Can't dry Atoka. Once the Atoka shale has become wet, there is no chance of returning to gas drilling. Circulation of large volumes of dry gas has been useless in those cases where the shale became wet for one reason or another. Sloughing and balling are so bad that there is little hope of ever drilling ahead. The only solution, according to Midwest's experience, is to load the hole with mud.

Crooked-hole country. Because of the highly faulted nature of the subsurface, the bit has a tendency to deviate more than in other areas. For this reason, bit weight has to be watched carefully, and kept much lower than is usually needed for fast penetration.

In one instance, using 3,000 lb. on the bit, the hole deviated as much as 3° in 100 ft.

Experience has shown that during air or gas drilling the safe bit-weight range is between 500 and 1,000 lb. per inch of bit diameter, or less. With more than that, the hole sometimes begins to deviate, and corrective action must be taken.

Logging program. Midwest has pretty well standardized on two logging programs—one for wells with gas in the hole, and one for wells with mud.

In gas-filled holes, a combination gamma ray-induction log has been used, and a density log is frequently run.

Temperature has been a big problem with the gamma-ray tools. Bottom-hole temperatures around 272° F. have been too high for logging equipment assigned to the Red Oak area. It has been necessary to import equipment from the Gulf Coast area—equipment that is designed for high-temperature operation.

This was a temporary problem, because future plans include completion with mud in the hole, and the induction-electrical log will be used, along with the density log. But if the hole can be completed with gas or air, no mudding up need occur unless special logs are desired.

Other types have been tried, but with little success. The acoustic log has not been too useful, because of cycle skipping. The microresistivity log gives poor results, because there is not enough mud-filtrate invasion in the zones of interest.

A dipmeter survey is usually run in all field wells because of the large amount of faulting that has been observed. Subsurface interpretation is quite difficult in this area, and the dipmeter gives additional data that could be useful in deciding on the next drilling location.

One of the things that makes logging difficult in these wells is the erosion that occurs in the Red Oak sand. Erosion beyond 36 in. has been noted, in streaks, from caliper surveys. There may be 5 ft. of eroded sand followed by 5 ft. of true-gage hole, then another eroded streak, and so on. Getting a true record of this type of hole is a difficult assignment for any logging tool. So Midwest relies on core data to supplement log data for reservoir evaluation.

And this erosion makes well completion difficult. Perforating tools must work through cement up to 14 in. thick, and two strings of pipe opposite the Red Oak. Abrasive jetting has been tried without too much success, but jet charges have worked well, under the circumstances. Future plans may exclude intermediate string, so only one string of casing will be penetrated.

Casing and cement programs. Planned casing program calls for 200 ft. of 16-in. conductor pipe, an intermediate string of 10¾-in. through the Atoka sand, cemented to the surface, 8,000 ft. of 7⅝-in. through the Red Oak sand, which may be eliminated, and a 5-in. liner to total depth, cemented up to the bottom of the 7⅝-in.

On 1 Maxey, the intermediate string was not run, and the production string was cemented from bottom up to a point above the Red Oak, a distance of more than 4,000 ft.

Because of this long column, it was necessary to use lightweight cement to avoid excessive pressures during cementing operations.

Midwest engineers feel that the

intermediate string may not be used in future wells. Decision will probably depend on hole conditions at the time, and a "wait and see" attitude seems advisable in this case.

While drilling the 1 Coblentz, casing was set at 9,000 ft. because of a hole in the 10¾-in. string. This hole was caused mainly by crooked cable-tool surface hole, and accentuated by gas-drilling operations. Normally this trouble is prevented by using heavier-than-necessary pipe in all strings. The 10¾-in. casing is 51-lb. J-55, and liners are 5-in. 18-lb. N-80.

Very little water has been found in wells drilled so far. This is one of the things that makes gas drilling so attractive in the area. What water has been encountered has been relatively fresh.

Fracturing needed. All completions require fracturing to establish commercial production. After pipe is set, mud in the hole is displaced with "heavy water" for completion operations.

On the latest job, in 1 Maxey, 70,000 gal. of gelled water was used, with 23,100 lb. of 20-40-mesh sand followed by 950 lb. of 12-16-mesh aluminum pellets in three stages with ball sealers between stages.

Aluminum pellets have caused a lot of trouble on Midwest wells, so they are being used now only to "tail in" at the end of a job. Trouble seems to be that the pellets flatten out in the blender, and then plate out down the hole. One well was fractured twice, and the productivity was reduced both times. In another well, the 1 Rider, screenouts occurred twice, and there was trouble with the pellets getting in the packer slips and other downhole equipment.

Reason that aluminum is used at all is that lab tests show it to be a better propping material than sand. But, because of some bad experiences, aluminum pellets are now being used only in the final stages, if at all.

In the 1 Rider, the pellets were dissolved out of the well with acid, and productivity was restored.

Safety precautions. Gas returns from drilling operations are flared about 100 yd. from the drilling rig. A pilot light is maintained at the flare at all times, and in case gas is encountered, it will be ignited immediately.

All lights around the rig are in vaporproof housings; all engine ignition systems are shielded, and engine exhausts are water immersed. Every precaution has been taken to prevent accident and injury while working with the explosive drilling fluid.

Double ram-type blowout preventers are used on all rigs in conjunction with a Hydril. A pressure accumulator with independent power supply is available so that in case of a complete shutdown of rig power, the preventers can be closed. The accumulator is located a safe distance from the rig, and can be controlled from the derrick floor, or from the remote location.

Contractors on Midwest's wells are Big Chief Drilling Co., Viersen & Cochran, and Fleet Drilling Co.

References

McClain, K. M., and Planalp, Roger N., General Geology of the Red Oak Gas Area, Latimer and LeFlore Counties, Oklahoma: Paper presented at the Tulsa Geological Society-Fort Smith Geological Society Joint Field Conference on Arkoma Basin and North-Central Ouachita Mountains, April 1961.

Nelson Refinery Cost Indexes

Published in the first issue each month in the Technology-Operation Section.

Compiled by W. L. Nelson, Technical Editor and petroleum refinery consultant, Tulsa.

Charts of the indexes are published each year in a late January or early February issue.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.

Refinery Construction Cost Index (1946 Basis)

(Explained on Page 101 of the issue of August 5, 1957)

	1950	1954	1957	1958	1959	1960	Apr. 1961
Pumps, compressors, etc.	138.2	166.5	206.7	214.7	226.5	228.3	229.1
Electrical machinery	134.9	160.0	188.9	192.7	195.8	195.2	192.1
Internal-comb. engines	126.0	150.5	173.9	178.3	178.5	180.7	180.9
Instruments	127.8	154.6	187.4	194.9	201.0	202.5	207.5
Heat exchangers	140.0	171.7	203.6	181.2	178.9	194.0	186.3
Misc. equip. average	*126.2	160.7	192.1	192.4	196.1	200.0	199.1
Materials component	149.5	174.6	201.9	204.2	207.8	207.6	208.1
Labor component	144.0	183.3	208.6	220.4	231.6	241.9	†245.6
Nelson construction index	146.2	179.8	205.9	213.9	222.1	228.2	230.6

Refinery Operating Cost Indexes (1956 Basis)

(Explained on Page 171 of the issue of June 1, 1959)

	1946	1952	1954	1958	1959	1960	Mar. 1961
Fuel cost	49.6	81.0	86.5	102.1	103.5	109.9	114.2
Labor cost	73.1	88.7	90.9	105.0	102.3	100.3	95.8
Wages	52.4	81.5	88.7	105.4	111.5	113.0	116.7
Productivity	68.3	90.2	97.1	100.3	109.0	112.9	122.0
Investment, maint., etc.	51.2	83.6	92.0	109.5	113.7	116.9	117.9
Chemicals cost	37.0	72.1	85.7	104.4	107.8	114.3	104.4
Operating cost indexes:							
Refinery	58.5	80.5	88.7	105.8	106.8	108.8	106.5
Process units‡	62.9	82.2	88.4	105.8	106.0	107.2	106.3

*Used in computing the Nelson Index until April 1952. †Converting Labor Component to 60% skilled labor rather than 50:50. Transition will be complete by May 1961. ‡Add separate index for chemicals, if any are used.

Photo-alignment maps most used by Great Lakes

Scaled one thousand feet to the inch, these maps have aerial picture of routes with pertinent data on surface features, land ownership, pipe data in parallel.

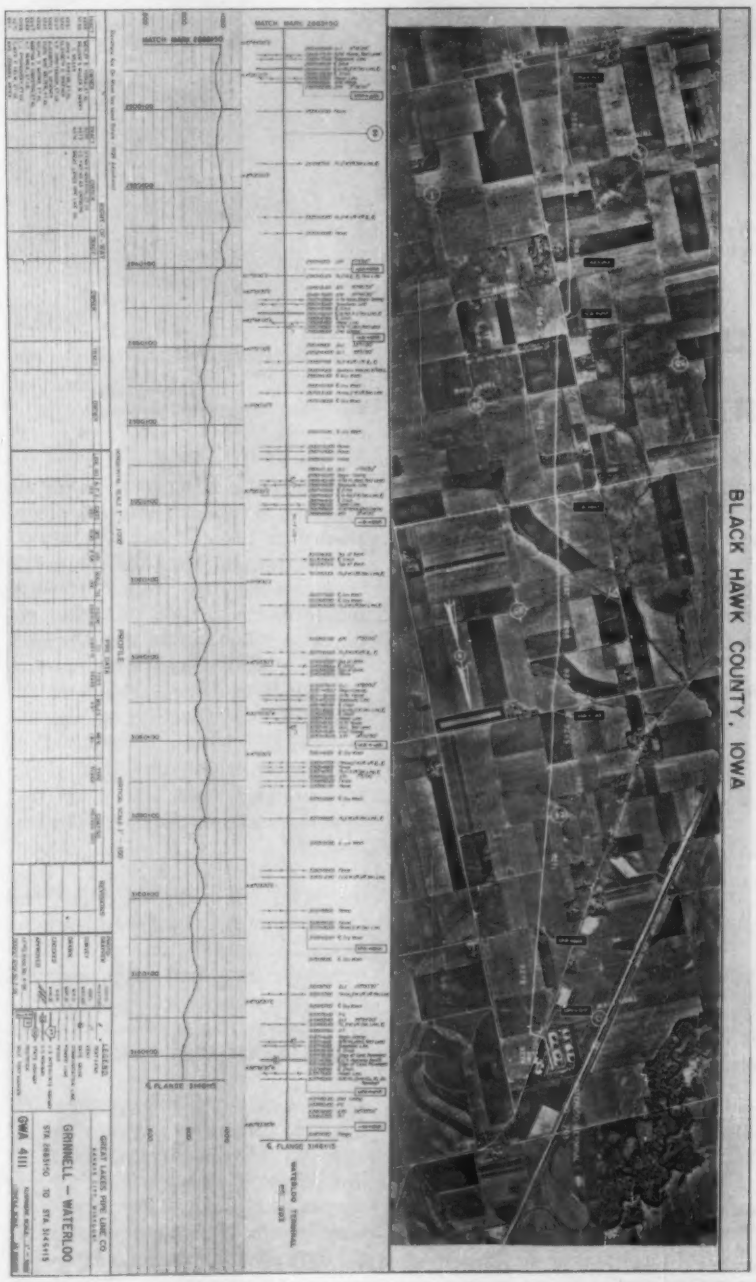


PHOTO-ALIGNMENT MAPS used by Great Lakes are made up with four sections: (1) aerial photo; (2) data on surface features; (3) profile, and (4) property ownership and pipe characteristics.

PIPELINE COMPANIES use both a great number and a great variety of maps. Great Lakes Pipe Line Co. is no exception—it estimates that its files hold more than 2,000.

Great Lakes has strip maps, photo alignment, land description, tax property, topography and profile maps, maps for the ICC, refinery connection, interstate highway reroute and flight maps, maps of restricted right-of-way, maps needed in new construction, and special maps done for specific purposes.

Most widely used and possibly the most important maps in Great Lakes' files are its photo-alignment maps. There is one for every 5 miles of pipeline right-of-way. Great Lakes has almost 6,000 miles of pipeline, much of it in parallel. It takes about 610 photo-alignment maps to cover the system.

These maps have a scale of 1 in. to 1,000 ft. They are divided into four parallel sections:

The top portion is the reproduction of an actual aerial photograph with the line and location of gate valves drawn in.

The second portion gives casing and test lead locations, and information on surface features such as fences, power lines, telephone lines, ditches, etc.

The third portion gives a profile of the land. In this instance the scale ranges from 750 to 1,050 ft.

The fourth portion gives information on ownership of the land through which the line passes and data on the pipe, date, weight, diameter, wall thickness, manufacturer, type, and coating.

Great Lakes draws maps on Mylar, a material that will neither stretch nor tear. As a result it lasts without change indefinitely.

Its surveying and mapping section in the engineering department serves many departments and nearly all divisions of the company. Maps are needed from time to time by construction, right-of-way, engineering, transportation services, tax, accounting, and all departments of the operating division to carry on the various facets of their work.

TRANSMITTER IN CAR operated by Lou Sterrett, Stanton, Ky., is located under dash. The speaker can be installed either beside the transmitter or out of sight behind it.

HERE ARE THE MICROPHONE, transmitter and receiver, all the components of a 21-lb. mobile unit. The receiver is also transistorized for more volume.

THE PORTABLE UNIT, one of six used by Columbia Gulf, weighs 11 lb., 7 lb. less than its predecessor. It also has more range and volume.

Transistor radios used for better communication

THE FIRST all-transistorized mobile communications system in the pipeline industry has been installed by Columbia Gulf Transmission Co.

Columbia Gulf scrapped its vacuum-tube units for transistorized equipment for more efficiency and greater reliability. These are some of the advantages that prompted the switch:

The transistorized units are more powerful, 100 watts compared to 60 for the vacuum-tube units. This gives them a mobile-to-base range of up to 60 miles, double that of the units that were replaced. This means that there are no dead spots on the pipeline between compressor stations.

The transmitter of the transistorized unit may be turned off while the receiver remains on. This reduces standby battery drain from 5 amp. for the vacuum tube units to 40 ma. It eliminates the need for engine idling when the radios are operating.

Both the size and weight of the transistorized units are much less than the vacuum-tube units. The former are about 45% of the size of the vacuum-tube sets and their weight, 21 lb., is one-third less. The smaller transistor units can be dash-mounted whereas the bulkier vacuum-tube units had to be installed under the seat or outside. The transistorized portables weigh only 11 lb., 7 lb. less than their predecessors.

The Columbia Gulf system, from South Louisiana into West Virginia, now has 97 transistorized units, 91 mobile and 6 portable. All are for use in the field. They are General Electric equipment supplied by Communications Engineering Co.

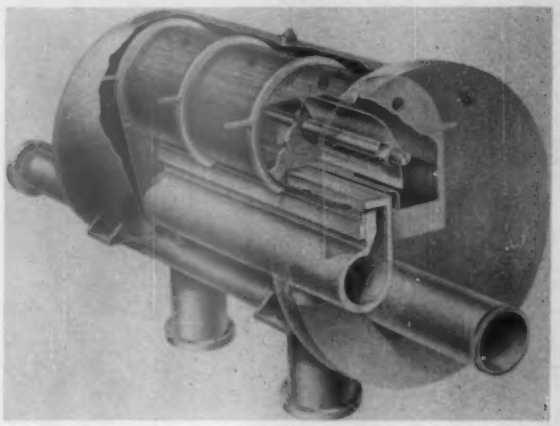
The accompanying table shows how the latter rates comparable GE vacuum and transistorized units.

DASH - MOUNTED mobile unit in truck operated by Floyd Abner, Stanton, Ky., occupies much less space than old vacuum-tube unit that had to be installed under the seat or outside the cab.

RADIO STATISTICS

	Vacuum tube	Transistorized
Power	100 watts	100 watts
Weight	51¾ lb.	21 lb.
Size	6¾ by 14⅜ by 17 in.	4 by 8⅝ by 15¼ in.
Battery drain (at 13.8 volts):		
Receive (standby)	6 amp.	0.04 amp.
Receive (with signal)	6 amp.	0.54 amp.
Transmit	33 amp.	25 amp.
Power supply	Vibrator and Dynamotor	Transistors
Receiver	12 tubes	17 transistors and 8 diodes
Transmitter	8 tubes	4 tubes

What's NEW . . . in equipment



Wet-screening unit for refineries

SOLID-LIQUID SEPARATIONS down to 40 μ are possible with this new unit which has been placed on stream in a refinery, according to the maker. The 300° DSM screen consists of a wedge-bar screen in the form of a 300° segment of a cylinder, with the opening at the bottom. Feed is introduced through a flat nozzle tangentially at enough velocity to travel completely around the segment.

Containing no moving part, the screen requires only pump pressure for operation. Installation requires three pipe connections: feed in, oversize out, and undersize out.

In a typical service, a unit occupying only 9 cu. ft. can handle 500 g.p.m. In one application, one of the screens is treating 450 g.p.m. of condensate containing 100 p.p.m. of trace particles. Ninety-five per cent of all solids are removed in a 60%, by volume, concentration, preventing particle breakover into the last phase of a two-phase condensate system, and protecting distillation-column efficiency.

Other potential uses in refineries and petrochemical plants include removal of trace impurities in condensate lines from stripping operations, countercurrent washings and extractions in any number of stages, and classification of polymer crystals. Source: **Dorr-Oliver Inc.,** 99 Havemeyer Lane, Stamford, Conn.

Want more facts about equipment or copies of product literature described in this issue?

Send this coupon

to manufacturer at address shown after each item.

Product name, Model no., literature title or number: _____

_____

_____

Described in OIL AND GAS JOURNAL issue of September 4, 1961

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

Slim-hole insert pump

Unrestricted filling of the fluid chamber is one of the features cited for this new 1-in.-bore, slim-hole insert pump now on the market. The pump is designed for use in slim-hole pumping wells using 1¼, 1½, or 1¾-in. nominal i.d. tubing strings.

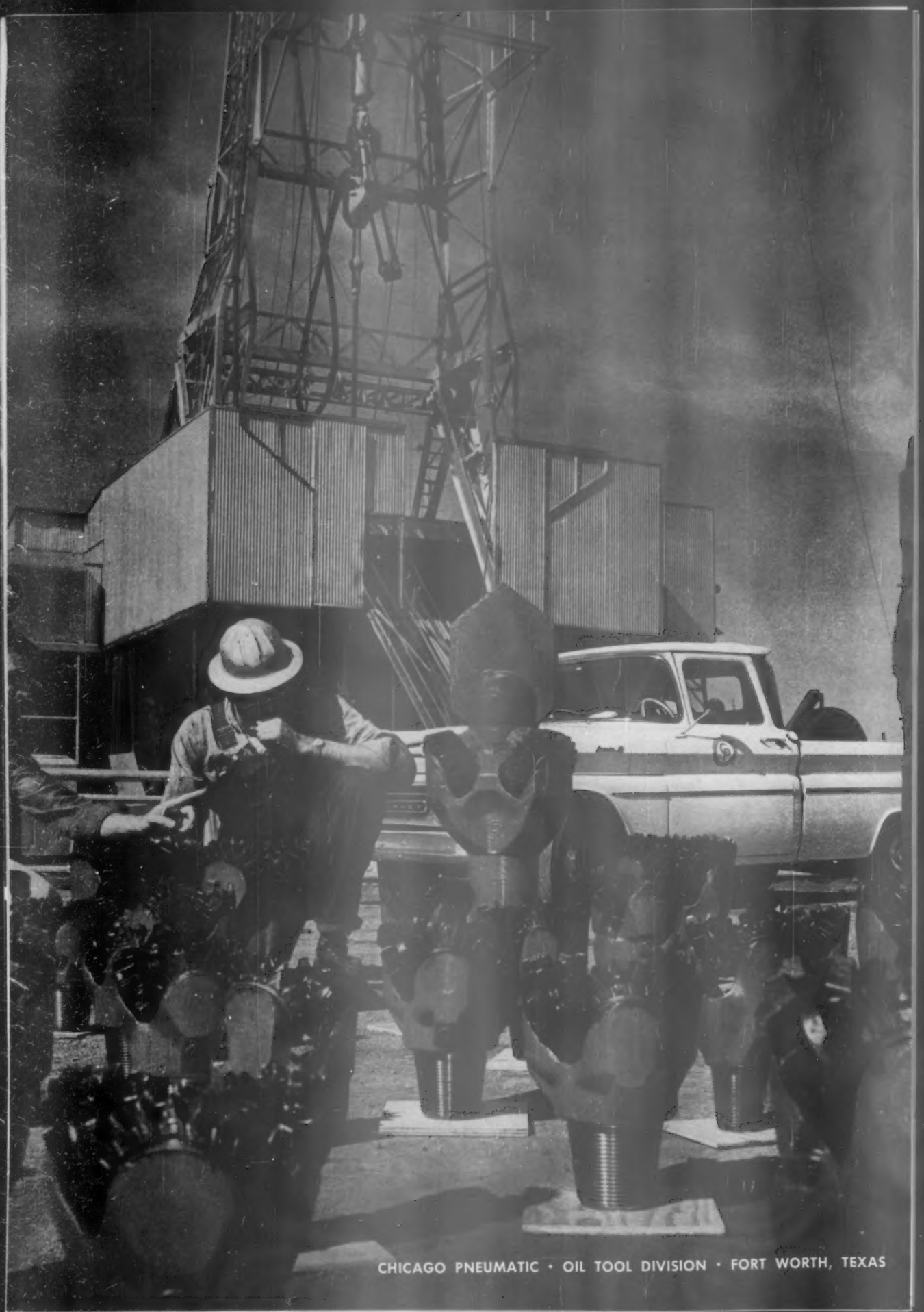
Other features include a precision-honed barrel tube, chrome-plated pin-end plunger, armored cages, and a three-cup bottom hold-down. Pump lengths range to 24 ft. with a maximum stroke of 17 ft. 1 in. The pump has a pin connection on top of it for ½-in. sucker rods. Source: **Continental-Emsco Co.,** Box 359, Dallas, Tex.

Meter-driven accessory

An electric pulser and transmitter has been brought out that's designed as a meter-driven accessory to operate various types of electrical equipment in direct proportion to meter throughput. The device is expected to find application in petroleum marketing, refining, pipelining, and lease automation. Carrying U.L. approval, the Series 5400 pulser is big enough to incorporate the gearing necessary for barrel, Imperial gallon, and metric registration. Source: **Ralph N. Brodie Co.,** Alvarado and 137th Ave., San Leandro, Calif.

Cast-iron butterfly valve

A barrel type off butterfly valve has been developed with a synthetic seal that the maker claims will not extrude or blow out. Rated at 200 lb. W.O.C., the valve can be operated easily under a pressure of 600 psi., the maker says. The valve comes with screwed ends in 2 to 4-in. sizes and with grooved or plain ends in 2 to 8-in. sizes. Source: **Charles W. Wheatley Co.,** 414 S. Detroit, Tulsa 20, Okla.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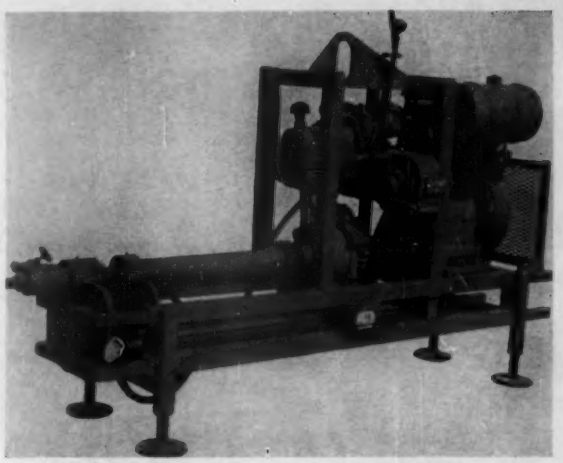

Compact road-boring machine

HOLES CAN BE BORED readily under streets, highways, and railroads with a new road-boring machine now on the market. Only 12 ft. of open ditch are required.

Designed for small-diameter boring jobs, the machine measures 76 in. long, 39 in. high and 20 in. wide. It weighs only 595 lb. Thus it can be hauled on a pickup truck.

A 7½-hp. gasoline engine, equipped with a kick starter, powers the drive shaft and the attached auger through a reversing transmission. A rotary hydraulic pump driven by the engine develops pressure for the hydraulic cylinder that drives the auger forward and retracts the drive shaft when new auger sections are added.

The engine also powers a centrifugal pump that forces water through the hollow-auger sections. Source: **Crose-Perrault Equipment Corp.,** 2765 Dawson Rd., Tulsa, Okla.

Portable vertical heater handy for tank farms

Two men can carry a new vertical tank heater around a tank farm to warm viscous fluids in storage as the heater weighs only 165 lb. The Type KV-244 heater has 244 sq. ft. of heating surface and will pass through an API 20-in. manhole. It can be installed in new or existing tanks, either singly or in banks.

Basically, the heater consists of two lengths of 1-in. IPS Schedule 40 steel pipe equipped with helical aluminum K-fins spaced six to the inch. These fins are ⅝ in. high and 0.03 in. thick. They are locked tightly to the pipe to give efficient heat transfer.

The two sections of finned pipe are welded together to form one continuous length. They are then wound into a helix of 13 turns with a 19½-in. diameter. Three steel channels support the helix and permit free thermal expansion. They also keep the heater above the normal sludge level in the tank. Source: **Griscom-Russell Co.,** 185 Wetmore Ave., Massillon, Ohio.

•

Smaller size meter

A companion meter to the Model V-250 gas meter recently announced is now available with a capacity of 175 cu. ft. per hour of 0.64 specific gravity gas at a pressure of ½ in. of water. All parts of the new Model V-175 meter are interchangeable with the Model V-250 — except the valve, valve seats, and valve-drive sprocket. Source: **Arkla Meters Div., Arkla Air Conditioning Corp.,** Russellville, Ark.

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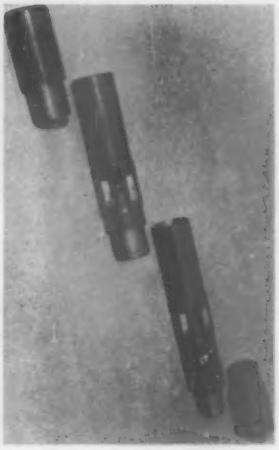
240

CHEMICALS DIVISION Olin



Section casing mill

A complete section can be milled out in one trip down a hole with this casing milling tool, the maker says, and windows of any desired length can be completed in one trip.

Design features of the new tool include multiple sets of knives to permit keeping the tool in the hole until the job is done. They underream as they mill, the maker reports. Full circulation can be maintained for fast removal of cuttings from the well and for effective conditioning of the exposed formation.

The tool comes in models for milling all sizes and weights of casing. Source: **Hunt Tool Co.,** Box 1436, Houston 1, Tex.

●

Fuel-valve adjustor

Fuel valve wear on industrial engines may be reduced with the installation of a device now on the market that keeps tension against the fuel-valve gear with a 15-lb. spring. The position is held temporarily by fluid in the device which will relieve this position, if subjected to continued tension.

Basically, the device is a bypass-metered balanced actuator capable of absorbing 0.375 in. of expansion and 0.125 in. of contraction. According to the developer,

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EXPLOSION-PROOF
For Class 1, Groups C and D; Class 2, Groups E, F, G installations. 60 to 500 W unsealed globe.

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For Class 2, Groups E, F, G hazardous locations. Sealed light, burns cool.

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The PSD AUTOMATIC REID VAPOR PRESSURE APPARATUS allows refiners to maintain closer approach to specifications and seasonal targets, gaining better utilization of valuable butane in motor fuels. When average Rvp of gasoline is increased 0.1 lb., the resulting butane conservation may amount to $4 per 1000 Bbl. of gasoline. For a 30,000 B/D refinery, profits can be increased $20,000 annually. In addition, continuous Rvp monitoring speeds batch blending of gasolines and adds flexibility to continuous blending systems at refineries or at pipeline terminals. More-efficient utilization of existing facilities means lower processing costs and deferment of capital expense. For new facilities, better efficiency allows economy in design and lower initial cost. The AUTOMATIC REID is explosion-proof, provides a continuous record, and is adaptable to closed-loop control applications.

The AUTOMATIC END POINT RECORDER helps increase yields of distillate fuels, helps protect reforming operations, and helps improve the quality of gasoline blending stocks. End point control of No. 1 fuel oil may add $100 daily to the profit of a 30,000 B/D refinery. When reformer feed contains excessive heavy ends, reforming capacity suffers and potential feed stocks are often diverted to distillates manufacture. Protecting reformer capacity may avoid hidden loss of profits amounting to more than $100 daily. Cat naphtha endpoint is often a limitation on quality. Protection of this important property allows better balance of heavy naphtha usage between gasoline and distillate fuels. The AUTOMATIC END POINT RECORDER is explosion-proof and simulates the ASTM test, recording the highest vapor temperature actively, manual introduction of samples allows surveillance of several streams as needed.

The CONTINOUS FLASH POINT RECORDER assists to maximize distillate fuel yields and safeguard product quality. No. 1 fuel production can be increased as much as 5% when flash point is brought 5°F. closer to specification. This more-profitable use of heavy naphtha may be worth $27,000 annually to a 30,000 B/D refinery. Continuous, positive monitoring of blending and transfer operations reduces reprocessing of off-test product, helps reduce storage requirements and speeds process decisions. These cost-saving advantages far outweigh the price of the instrument. The CONTINUOUS FLASH POINT RECORDER is explosion-proof, accurate to 2°F. over the range 80-190°F. For tropical installations, mechanical refrigeration can be supplied. An optional strip-chart recorder provides a continuous signal for use with automatic control systems.

The AUTOMATIC LOADING RACK FLASH TESTER gives positive assurance that deliveries of home heating fuels are safe, free from low-flash contamination. Transports are released without delay for laboratory tests; return-haul and demurrage charges are climinated. Loading documents are automatically stamped when load meets flash requirements. Warning light appears and automatic stamp is deactivated if load is contaminated. The instrument may be preset for any temperature between 100 and 140°F., to conform to local regulations. Explosion-proof construction permits installation in loading areas, convenient for loaders and drivers. Automatic stamp permits use at keylock or remotely-operated terminals.

We're sure you know the possibilities in your processes. Let us send you more information on our instruments. We'll be glad to help solve your problems just ask us.

Precision Scientific Development manufacturers under exclusive licenses, quality-sensitve process instruments that offer many opportunities to reduce refining costs and increase profits. Some of the typical ways each instrument can help your processes are described. You'll see that almost any refinery can make more money through process instrumentation.

psd **Precision Scientific Development**

3745 W. Cortland St. Chicago 47, Ill.

the device not only reduces valve and seat wear but eliminates adjustment of the tapped clearances when starting an engine and final adjustments when the engine has reached operating temperature. It's suited to two or four-cycle vertical engines. Source: **Panhandle Industrial Co.**, Box 680, Pampa, Tex.

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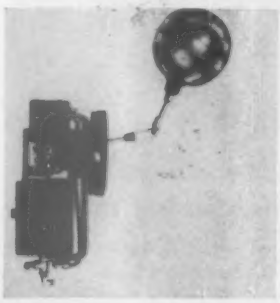

Separator control

This quick-coupled, single-float type of metering-separator control is claimed to offer both economy and flexibility in the design and construction of metering separators.

Complete metering control, including counter and pneumatic actuator, is installed in the vessel through a short grooved nipple, welded in the side of a vessel. The float can travel ±65° from the horizontal. This allows ample travel to accurately meter 1 bbl. in a 20-in. vessel. The float is fully adjustable for all vessel sizes.

The R-900 control assembly is complete and includes prepiping. All controls, the pilot, relay, counter, actuator, are mounted in weatherproof housings. All moving parts are made of stainless steel; the housings are of anodized aluminum. Through a window in the cover plate, the counter is easy to see. Only three connections are needed to put the metering control in operation: the supply gas and the three-way motor valve. Source: **Odex Engineering Co.**, Box 10177, Houston 18, Tex.

•

Easier emulsion-breaking

A treating device now available and designed to increase the efficiency of emulsion-breaker chemicals can be installed in the flow line so that all fluid going to the treating unit will pass through it. Available in sizes to fit 2 to 6-in. lines, the device is claimed to offer a way to reduce chemical consump-

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tion and, in some instances, to reduce the normal heat requirements. Source: **Visco Products Co.,** Box 87, Houston, Tex.

•

Multi-use floodlight

Two reflector diameters are available on this new Intenso floodlight. The 14-in.-diameter unit accepts 750 to 1,500-watt incandescent or 400-watt mercury-vapor lamps. Both open and closed types are available.

The floodlight is easy to service from the front or, through a swing-over design, from the rear. Features include a self-centering reflector and a filter wick to keep the reflector and cover glass free of dirt and condensation. Source: **Appleton Electric Co.,** 1701 Wellington Ave., Chicago 13, Ill.

•

Lighted pushbutton

Now available for hazardous areas is a lighted pushbutton station, an explosionproof, NEMA 7 type. Designed for Class 1, Group D service, the product is completely weatherproof. You can use it either as a push-to-test pilot light, or as a combination pushbutton and pilot light.

The product is available in the maker's explosionproof pushbutton enclosures, or individual units may be obtained for use in other housings.

The molded-glass lens come in several colors. A 6.3-volt bulb, mounted for easy replacement, lights the station. Voltage may be 110, 220, or 440. Source: **Nelson Electric Mfg. Co.,** Box 5385, Tulsa, Okla.

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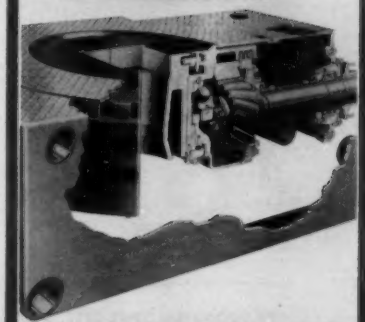
ROTARY TABLES



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Johnston Vertical Pump Case Study:

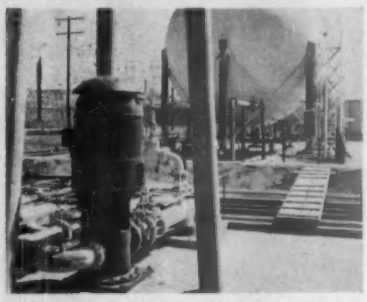
Mobil Oil Refinery, Torrance, California

The Mobil Oil Refinery in Torrance, California, has a capacity of approximately 100,000 barrels per day. Practically all processes in the refinery produce light hydrocarbons which are gathered and fractionated into several relatively pure components. These components, which include normal butane, are pumped to spherical pressure vessels for intermediate storage.

From the pressure vessels the butane is pumped to the tank farm to be blended into gasoline or to LPG trucks for delivery to customers.

Johnston Pump 5-year Record

Of all the Johnston pumps in light hydrocarbon service in this Mobil Oil Refinery, the Johnston that pumps liquified butane from the pressure vessels to the tank farm, one-half mile away, is probably most used. This pump has not been pulled for maintenance for more than 5 years.



Johnston 50 HP Pump Between Pressure Vessel and Tank Farm

More Johnston Verticals

Johnston has a reputation in the industry as a specialist in vertical pumps. The 50 HP mentioned above is called in the industry a Butane Blending Pump. It is basically a transfer pump.

Specifications are given in Fig. 1 together with other Johnstons, one or more of which are at work for Mobil Oil in Torrance. The schematic (Fig. 2) shows the method of transferring the butane, but it doesn't include the two 5 HP units listed in the specifications. These two Johnstons are a part of the TCC process installation. They are in continuous operation, pumping water containing a high percentage of H_2S away from the gasoline accumulator.

#1—Barrel Pump • 700 gpm capacity • 284 ft. head • 50 hp. • 6 stage, 12 BC bowl assembly
#2—Barrel Pump • 100 gpm capacity • 1200 ft. total dynamic head • 30 hp. • 20 stage, 6 AC bowl assembly
#3-4—150 gpm capacity • 290 ft. head • 7½ hp. • 14 stage, 7 CC bowl assembly
#5-6—62 gpm capacity • 144 ft. total dynamic head • 5 hp. • 3 stage, 6 AC bowl assembly

FIG. 1

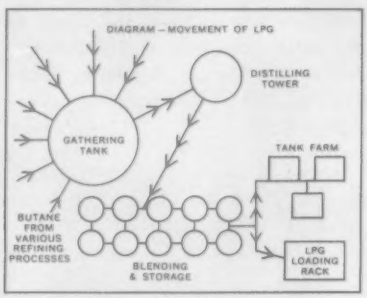


FIG. 2

Johnston pumps have been dependable servants of the oil industry for many years in refineries, pipe lines, water supply and injection service for secondary recovery and offshore work.

A trained Johnston field man will be glad to give you complete information or show you how Johnstons can best serve in your operation. There is a Johnston field man located in your area. A call to the Factory or branch nearest you will put him in touch with you within a few days.

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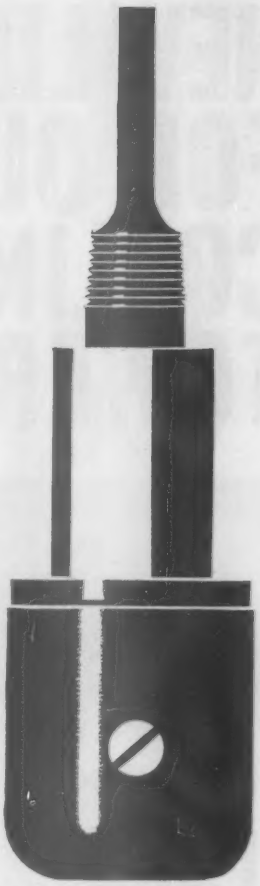

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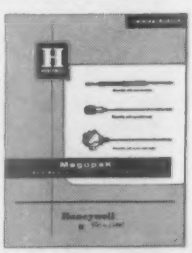

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What's NEW

. . . in literature

Increase water-flood-injection rates

Bulletin I-219 describes the use of Petrofos (sodium tripolyphosphate) to increase water-flood-injection rates and speed oil recovery in secondary-recovery projects. According to the literature, the product results in cost savings in several ways. In addition to describing methods of using Petrofos in oil-recovery operations, the bulletin gives physical and chemical properties of the product, tells how it works, and contains an appendix of evaluation procedures. Source: **Inorganic Chemicals Div., Monsanto Chemical Co.,** 800 N. Lindbergh Blvd., St. Louis 66, Mo.

Electrical and welding equipment

Printed in Dutch, English, French, and German, this four-page product bulletin lists pieces of equipment that make up the company's manufacturing program. Products include high rating, high-voltage transformers, arc-welding electrodes, welding fluxes and wires, welding accessories, and electric furnaces for the chemical industry. Source: **Willem Smit & Co.'s Transformatorenfabriek N.V.,** Groenestraat 336, Nijmegen, Holland.

Guide to coupling selection

Now being offered is this new brochure which gives sizes and applications of couplings for a number of uses. Included are line drawings which show construction features and advantages of the different types. Source: **Standage Power Couplings, Ltd.,** South Coast Works, Telscombe Cliffs, Sussex, England.

Steel design, engineering concepts

Four papers which discuss advances in strength levels, product forms, and design applications of constructional steels are printed in a new 64-page brochure, now being offered free. The papers describe and compare types of steels that make up the modern "family" of constructional steels. Illustrations and descriptions of many actual designs and design concepts show how

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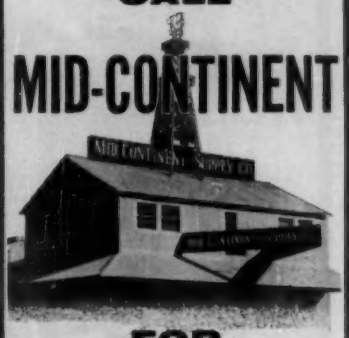

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Get high conveying capacity—when and where you want it—without the expense of duplicating equipment. Fuller Portable Airveyor® Transfer Units provide flexible, lower-cost handling to and from cars, trucks, storage bins and silos of every type. Hook-ups are quicker, too, because these Fuller units use pipes, hoses and nozzles of minimum size to deliver maximum capacity. Units combine clean-cut appearance with compactness and stamina never before available in portable equipment. Made in three sizes, the units are rated to handle pellets from 4 to 20 tons per hour for conveying distance of 30 feet on the suction side and 100 feet on the pressure side.

For full details, write for Bulletin A-23.

See Chemical Engineering Catalog for further details and specifications.

4083
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Subsidiary of General American Transportation Corporation
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these steels can be used in structures and equipment to achieve high strength, light weight, and low costs. Source: **U. S. Steel Corp.,** 525 William Penn Pl., Pittsburgh 30, Pa.

Programed stress relieving

Folder DM-157 describes a 400-cycle induction heating unit and tells how it simplifies the preheating and stress relieving of arc-welded pipe joints. It illustrates and describes automatic operation by means of strip-chart program controller. Also shown in the four-page literature piece are typical installations. Source: **Hobart Brothers Co.,** Troy, Ohio.

New Jersey chemical complex

The inception and growth of a complex of chemical plants at Toms River, N. J., for Toms River Chemical Corp. is the subject of an available brochure just published. Products produced by this multimillion-dollar project include liquid and solid Araldite epoxy resins in addition to a variety of azo and vat dyes. Four major dye and resin plants are described in terms of investment decisions, the process utilized, and the realization of the finished plant. The 12-page brochure also details management decisions involved in the selection of the site. Source: **M. W. Kellogg Co.,** 711 Third Ave., New York 17, N. Y.

Oil-burning equipment

Detailed in this eight-page brochure are combined oil-gas burners, now in use all over the world, for refineries and chemical plants. The publication lists component parts of the burners and presents detailed information on each. Included are photos, line drawings, graphs, and accessories. Source: **J. Duiker & Co.'s Fabriek van Apparaten en Werktuigen N.V.,** Swammerdamstraat 5, The Hague, Netherlands.

Comprensive data on alcohols

This 80-page booklet contains comprehensive data on 21 alcohols, from methanol to tridecanol. Included is information on physical properties; constant-boiling mixtures; specification limits; test methods; storage, handling, and shipping; toxicological properties; and se-

SERIES A-88 CONTROLLERS

Designed to give rugged, dependable performance, American® Series A-88 Controllers provide versatile, positive control of... Flow, Pressure, Liquid Level and other continuous process variables...accurately and automatically.

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- Proportional Band easily widened without disconnecting instrument tubing.
- Spring-closing Reset Valve sealed with bellows and calibrated according to time.

Ask for Bulletin 406.

AMERICAN METER COMPANY

Sales Offices in Principal Cities

lected literature references. Special sections describe ethanol in proprietary solvents, alcohols for chemical specialties, performances of alcohols in coatings, and performances of plasticizers. The section on coatings deals with resin solubilities, relative evaporation rates and dilution ratios, and similar coatings-formulation data. Source: **Union Carbide Chemicals Co.,** 270 Park Ave., New York 17, N. Y.

Vapor-pressure thermometers

This up-to-date, eight-page publication describes thermometers manufactured by a British company, and gives information on a variety of modifications and accessories which may be supplied for individual applications and processes. The thermometers are made with either 4 or 6-in. dials, calibrated to cover a variety of ranges within the limits of −10° to 650° F. Source: **Cambridge Instrument Co., Ltd.,** 13 Grosvenor Pl., London S.W. 1, England.

Dual-pumping-unit data

A dual pumping unit for multiple completions is described in a new four-page folder. According to the folder, the Siamese dual pumping unit offers a way to reduce capital investment and operating costs compared with older types of pumping units. The folder compares the cost of pumping a dual well by the Siamese unit with the costs for pumping with two units and with one unit. Source: **American Mfg. Co. of Tex.,** P. O. Box 7037, Fort Worth, Tex.

Gasket materials

Brochure AD-190 answers these questions: What are the best available gasketing materials? How do you choose the right gasketing material? What is the correct gasket design? In 24 pages it details resistance rating for 120 fluids and gases. Technical data charts appear with a description of 25 conventional rubber styles, 22 styles of cloth, nine styles of compressed asbestos sheet, four styles of woven asbestos, and five styles of vegetable fiber sheet. The brochure introduces newer gasket materials, including Viton, silicone, neoprene, and Teflon. Source: **Garlock, Inc.,** Palmyra, N. Y., U.S.A.

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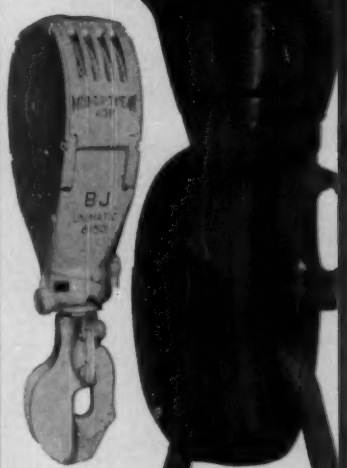

SURE SERVICE — SURE SUPPLY

MC3-1

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

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Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK

▶▶▶ Equipment Men Notes

John W. Coburn named manager

. . . of the Oklahoma City district of U. S. Steel's Oil Well Supply division. Coburn has been assistant Oklahoma City district manager since 1954. He has been with the company since 1937 and served as Shreveport, La., store manager before moving to Oklahoma City.

Sales-rights agreement reached

. . . by Crosby Valve & Gage Co., Wrentham, Mass., and Piping Engineering Co., Tulsa, will give Crosby exclusive right to market the valve test stands and equipment designed for the company by Piping Engineering.

Present line of products includes models designed for up to 2,000 psig. operation. Models for higher pressures are also designed on application.

Crosby and Peco have named Lasco Engineering, Inc., equipment design specialists in Tulsa, as consultants for further development of testing equipment.

New field assignments made

. . . by Schlumberger Well Surveying Corp. Among those involved are T. I. Obenchain, field engineer general in Cut Bank, Mont., who will move to Farmington, N. M., as a senior sales engineer, and O. Wayne Burnett, field engineer general in Williston, N. D., who will move to Newcastle, Wyo., as sales engineer.

D. C. Ross, field engineer, special services, in Corpus Christi, Tex., has been transferred to Abilene, Tex., and promoted to location manager. S. R. Harris, Effingham, Ill., field engineer general, has been promoted to location manager.

J. A. Burke, field engineer in Kermit, Tex., has moved to the Permian basin division in Midland, Tex., as a sales engineer. K. S. Howell, Houston field engineer general, has been named sales engineer in the Texas Gulf Coast division.

C. E. Tedrow, location manager in Pampa, Tex., has been transferred to Wichita as senior sales engineer. B. M. Ray, senior sales engineer in the Kansas division, will succeed Tedrow in Pampa.

H. J. Nickle, senior sales engineer in Wichita, has been named location manager for the Wichita district office. W. C. Graves, sales engineer in Magnolia, Ark., has been transferred to Natchez, Miss.

Edward R. Graves will manage General Electric field sales

. . . in the market-development organization, technical products operations, in Syracuse, N. Y. Graves had been Philadelphia district manager of assemblies and component sales since 1955. In the new position he will be responsible for industrial, commercial, and military markets assigned to the market-development group.

Research Institute makes award

. . . to Black, Sivalls & Bryson, Oklahoma City, in recognition of the company's contributions to business research and its efforts to stimulate personal and professional growth of employes. Arthur D. Kinser, BS&B manufacturing manager, accepted the award for the company.

More than 30,000 firms in the U. S. and Canada participate in the Research Institute of America program.

Staff changes are made

. . . by Catalysts & Chemicals, Inc., Louisville, Ky. Paul Huber, manager of manufacturing, has been named chief engineer and will handle installation of new equipment and buildings for a planned expansion program. Dr. Wilson Barnes, formerly with Corhart Refractories Co., will succeed Huber. Jay Hager, Seco Chemical Co., and Rolf Kogstad, Collier Carbon & Chemical Corp., have joined Catalysts & Chemicals' sales department. Hager will be in domestic sales and Kogstad in foreign sales.

Also, Robert Habermehl, manager of the customer technical-service group, has been named manager of engineering sales. Ernest Northcutt will succeed Habermehl. Bruce Burklow, formerly with Goodrich Chemical Co., has joined Catalysts & Chemicals in the customer technical-service group. Donald Needy, Morgan Wheeler, Karl Russ, and Bruce Hendrickson have joined the staff of the research and development department.

Noah E. Hull has retired

. . . as assistant to the vice president of manufacturing for Hughes Tool Co. Hull also has been vice president and general manager of Hughes Gun Co., a subsidiary, since 1951. He joined Hughes in 1946.

INTERNATIONAL GUESTS at the August meeting of the Los Angeles Nomads were, from left, front row: Loren E. Gray, IPC, Iraq; John L. Alexander, IPC, Iraq; J. A. Wilkinson, Camdrill, Libya; James R. Dorrance, Caltex Pacific Oil Co., Indonesia; Mercer Martin, Basrah Petroleum Co., Iraq. In the second row, from left, are Tom Mathai, Oil and Natural Gas Commission, India; Al Dysart, Aminoil, Kuwait; Karl Mercer, Servco Co., Paris; and Hajime Fujita, Japex, Japan.

MARTIN RUBBER & DUCK RINGS give excellent life in dirty abrasive fluids . . . high or low gravity . . . much or little water . . . shallow or deep wells. They last for years in the easier pumping wells. Replacement rings cost comparatively little.

MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

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Write for our new catalog or see it in the Composite (24th Edition). All products sold thru supply companies.

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New company formed

. . . by Robert E. Simpson, former manager of L-O-F Glass Fibers Co. The new company is Mineral Fiber Manufacturing Corp. Home office will be in Houston. Officers will include Simpson, president; Dr. W. P. Bonin, vice president; J. P. Bristow, vice president; and George Hillyer and James A. McBride, directors. Major product of the firm will be a glass fiber pipeline felt.

Simpson

Assistant general manager named

. . . by Tapecoat Co., Evanston, Ill., is J. Russell Wall. Wall has been in charge of Canadian operations at the Rexdale, Ont., plant of Tapecoat Co. of Canada. He will be succeeded in this post by Harold J. Picard. Wall joined Tapecoat in 1952 as sales engineer in Pittsburgh. He had been with Tapecoat of Canada since it was organized in 1958.

Sales representatives named

. . . for three store areas of U. S. Steel's Oil Well Supply division. They include Donald G. Kiihn, who will headquarter in Cut Bank, Mont.; Robert W. Anderson, who will work out of the Vernal, Utah, store; and Gene H. Stumpf, who will headquarter in Gillette, Wyo.

American DEMAG opens office

. . . in New York City. American headquarters of the company will remain in Pittsburgh, however. Both offices will be supervised by George Alexander Zaharoff, vice president. American DEMAG is a subsidiary of DEMAG Aktiengesellschaft, Duisburg, Germany.

Sales engineer moved to Houston

. . . by American Machine & Foundry Co.'s AMF international division — American Iron & Machine Products. William H. Barry is making his headquarters in the office of American Iron & Machine Works Co., a subsidiary. The transfer will improve service to export customers, the company said.

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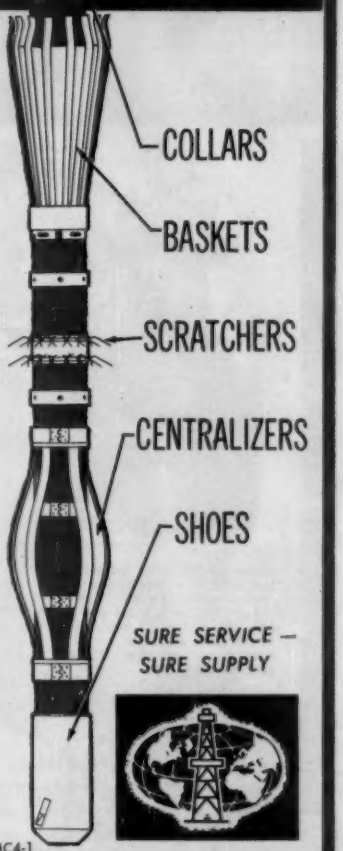

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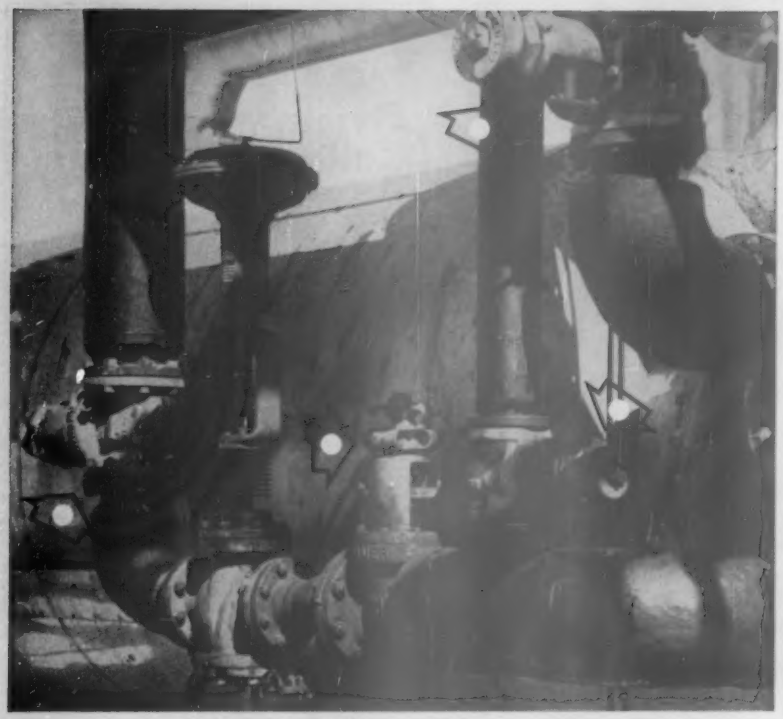

Hamer non-lubricated, non-sticking plug valve with gland packed stem seal. Standard opening. Sizes 1" through 12", in ASA 150 lbs. and ASA 300 lbs. series. Available in carbon steel and other metals to meet special corrosive and temperature conditions.

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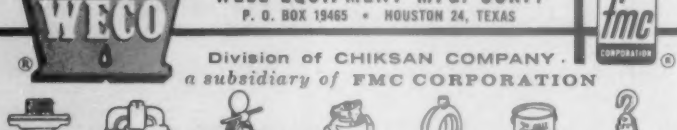

WECO UNIONS · CHIKSAN SWIVEL JOINTS · HAMER LINE BLIND VALVES · HAMER PLUG VALVES · WECO AIR-O-UNION · WECO COMPOUNDS · WECO SNATCH BLOCKS

Jones & Laughlin Supply makes three store management changes

Two new district store managers and one new store manager have been appointed by the company.

Nemeth

Seeker

Atyia

They are: Julius Nemeth, Harvey, La., salesman, named district store manager in Morgan City, La.; W. H. Seeker, Jr., Snyder, Tex., store manager, promoted to district store manager in Hobbs, N. M.; and Haney Atyia, salesman in Midland, Tex., who will succeed Seeker as store manager in Snyder.

Service Tool is purchased

. . . by Land & Marine Rental Co., at Harvey, La. Land & Marine operates a rental yard in Morgan City, La., and has offices in Houston. Acquisition of the Harvey yard will provide expanded rental facilities.

Ken Curry is manager of the Morgan City yard. Wayne May is manager in Harvey. Also located at the Morgan City yard are Jack Rankin, assistant, and Carrol Gautreaux. O. U. Thomas is field representative in Morgan City.

Jack Lubbes, sales manager, is in Lafayette, La., and W. L. Horton, secretary-treasurer, in Houston. Cecil DeArman is president and Rex Hudson is vice president.

New Magcobar company formed

. . . to market Magnet Cove Barium Corp. drilling mud products in West Germany. The new company is Magcobar Division of Dresser (Germany) G.m.b.H. Johannes Hubert Kuckertz has been named manager.

Headquarters of the new firm will be in Kreis, Germany, with warehouse stocks in Waser, Germany.

Microwave activity is integrated . . . by Collins Radio Co. within its new systems division, the Alpha Corp. Alpha, formerly operated as a subsidiary, is now a division of Collins.

Kerry R. Fox has been named director of the new microwave systems division. Other appointments in the division include R. S. Willard, manager of microwave sales; L. M. Fisher, manager of microwave systems engineering; and H. G. Kraft, business manager for microwave contracts.

Named to the sales group under Willard are T. A. Farrell, staff assistant; R. M. Millner, manager of western area sales; A. K. Urschel, manager of government sales; E. A. Jenkins, manager of sales service; and D. L. Smith, manager of customer service. Willard will be acting manager of the eastern area sales.

Five eastern area sales offices will be headed by H. E. Solem, Tallahassee, Fla.; W. T. Allott, Nashville; J. A. Dolsen, Detroit; B. Farquhar, New York; and R. I. Hancock, Washington.

Western area sales managers will be D. F. Snyder, Denver; W. D. Leonard, Los Angeles; J. O. Fordham, San Francisco; E. C. Vick, Minneapolis; and in Dallas, C. E. Little and R. G. Yount.

Dallas firm is acquired . . . by Wheel Trueing Tool Co., Detroit. Drilling & Service, Inc., Dallas, has been Wheel Trueing's sales and service outlet in the drilling industry since 1946. Its sale to the Detroit firm will better coordinate manufacturing and research with sales and service, Wheel Trueing said.

Under the new set up the company will be operated as Drilling & Service, Inc., subsidiary of Wheel Trueing Tool Co. Terms of the transaction were not revealed.

Dowell opens new sales office . . . in Pittsburgh to serve the Pennsylvania and New York areas. Harold F. Coil, district sales engineer, will be in charge of the office, under supervision of the Evansville, Ind., district office.

Dowell division has also promoted John H. McBryar, purchasing agent, to assistant general purchasing agent. Also, William M. Ross, Jr., petroleum enginer in Hobbs, N. M., has been transferred to the division's Tulsa general office.

Five sales appointments made . . . by Mission Manufacturing Co. C. E. Van Loozen, western district manager, has been promoted to industrial sales manager. F. J. Herbert, southeastern district production sales representative, will succeed Van Loozen. Harold Herren will succeed Herbert.

Also, Melton Wright has been appointed sales administrator, and Johnny Warren has been assigned to packaged gas turbine, round power, sales.

New name has been chosen . . . for A. O. Smith Corp.'s Reinforced Plastics division. Because of broadened activities, it will now be known as Glass Fiber Products division. The division was formed in 1958.

Herbert Alexander is appointed . . . by Plastic Applicators, Inc., Houston. He will headquarter in Midland, Tex. Alexander joined Plastic Applicators in 1960. He had been a sales representative in Odessa, Tex.

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DESCALER

ACIDIZE ALL TYPES OF WELLS—

oil, gas, repressuring and disposal—conveniently easily with DRY ACID DESCALER. This dry, free-flowing inhibited acid can be handled safely by lease personnel and is ideal for small "dump shots" of acid.

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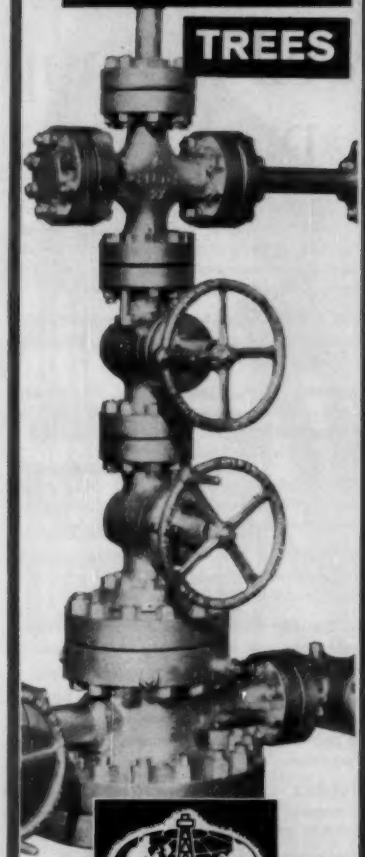

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nine Dowell products to help operators solve

well cleanup problems

Dowell offers nine effective chemical products to help you solve well cleanup problems. Treatments using these products have boosted production, decreased lifting costs, improved injectivity, even brought in some wells.

BULK ACID—inhibited hydrochloric acid used to dissolve carbonate scale, limestone, and other materials.

INSTANT ACID— Dowell acid in granular form. Add water and it's ready to use. Convenient where transportation or storage of bulk acid is a problem.

VERSENE® 100 chelating agent used to remove difficult scale deposits, including calcium, magnesium and barium sulfate.

FREFLO* — Dowell mixture of oil-soluble, surface-active chemicals — used to prevent or break water blocks in wells.

DETERGER* water-soluble, surface-active agent used for well cleanup ahead of fracturing and acidizing treatments.

EZEFLO* low-pour-point, concentrated nonionic surfactant used in water injection wells to reduce pressures and increase water injection rates.

MUDBAN* — non-acid Dowell product — used to remove drilling mud from producing formations by penetrating and dispersing action.

FOAMING AGENTS—Dowell chemicals in liquid and stick form used to unload water or petroleum liquids from gas or oil wells.

PARAFFIN SOLVENTS— non-chlorinated solvents designed to dissolve paraffin accumulations in wells or surface equipment.

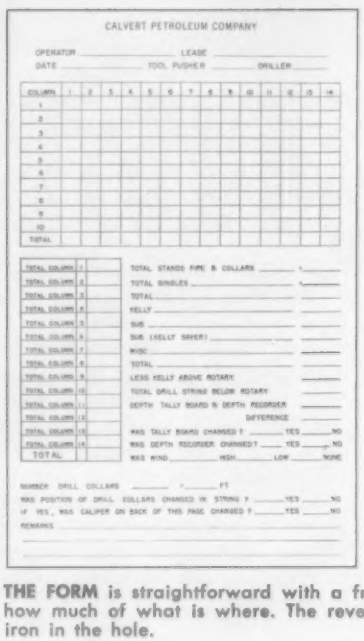
Call your nearest Dowell representative for full information. *DOWELL TRADEMARK

PRODUCTS FOR THE OIL & GAS INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DRILLER has easy check on his drill string by the use of this simple tally sheet.



CALVERT PETROLEUM COMPANY

OPERATOR _____ LEASE _____

DATE _____ TOOL PUSHER _____ DRILLER _____

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
TOTAL														

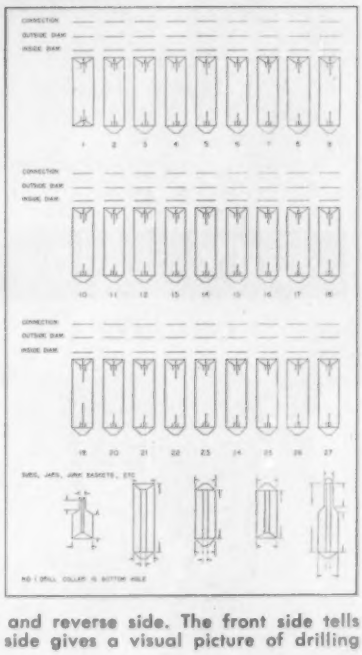
TOTAL COLUMN	1	TOTAL STANDS PIPE & COLLARS _____ = _____
TOTAL COLUMN	2	TOTAL SINGLES _____ = _____
TOTAL COLUMN	3	TOTAL _____
TOTAL COLUMN	4	KELLY _____
TOTAL COLUMN	5	SUB _____
TOTAL COLUMN	6	SUB (KELLY SAVER) _____
TOTAL COLUMN	7	MISC _____
TOTAL COLUMN	8	TOTAL _____
TOTAL COLUMN	9	LESS KELLY ABOVE ROTARY _____
TOTAL COLUMN	10	TOTAL DRILL STRING BELOW ROTARY _____
TOTAL COLUMN	11	DEPTH TALLY BOARD & DEPTH RECORDER _____
TOTAL COLUMN	12	DIFFERENCE _____
TOTAL COLUMN	13	WAS TALLY BOARD CHANGED ? _____ YES _____ NO
TOTAL COLUMN	14	WAS DEPTH RECORDER CHANGED ? _____ YES _____ NO
TOTAL		WAS WIND _____ HIGH _____ LOW _____ NONE

NUMBER DRILL COLLARS _____ @ _____ FT

WAS POSITION OF DRILL COLLARS CHANGED IN STRING ? _____ YES _____ NO

IF YES, WAS CALIPER ON BACK OF THIS PAGE CHANGED ? _____ YES _____ NO

REMARKS _____



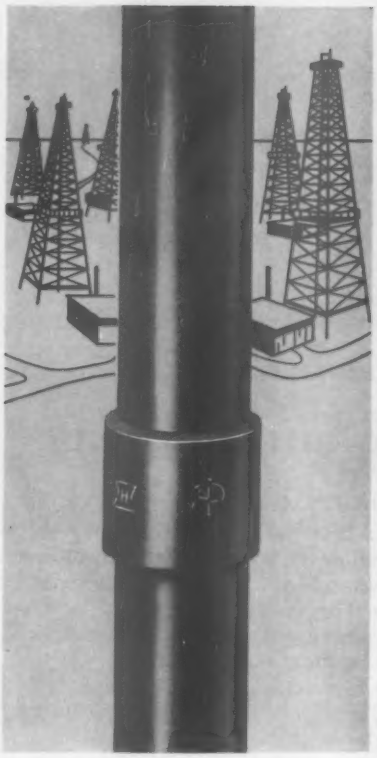
THE FORM is straightforward with a front and reverse side. The front side tells how much of what is where. The reverse side gives a visual picture of drilling iron in the hole.

Sample tally form shows makeup of drilling string

THERE ARE numerous occasions in drilling when it is absolutely imperative to know the exact length and diameter of each and every tool in the drilling string. Yet, there are probably few men who have been a driller for long without at some time finding themselves uncertain about just what lengths and diameters make up the string in the hole.

Sometimes the reason for the uncertainty is carelessness. More often, the reason is that the driller had no easy way to keep track of the dimensions of downhole equipment.

To prevent such situations aris-



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FOR OIL DRILLING AND WHEREVER PIPE COUPLINGS ARE USED Harrisburg Steel has been well-known for many years — well known for high quality seamless steel couplings — of strength and accuracy — with threads unexcelled in correctness of form, height, angle and lead.

Manufactured to A.P.I. specifications, Harrisburg tubing and casing couplings are under constant inspection for uniformity of quality — to bring to you a product which will meet the most critical requirements.

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HARRISBURG STEEL CO.
Division of HARSCO CORPORATION
HARRISBURG 6, PENNSYLVANIA

ing on its rigs, Calvert Exploration Co. has adopted a new drill-stem tally form. This form is distributed to the rigs in convenient booklets and kept current by the drillers.

Because Calvert's tally is arranged in convenient fill-in-the-blanks style, it is easily kept. Moreover, there is less chance for error in transposing figures. Drill-pipe tally is arranged in columns and rows. Then, total of the columns is placed in another vertical column for adding.

Drill collars are drawn out individually so that connection size, outside diameter, and inside diameter are shown for each. Moreover, the individual subs, jars, junk baskets, and the like are drawn out for individual measure.

West Virginia activity is high

IN NORTH CENTRAL West Virginia activity is high in Lewis and Braxton counties. Braxton County has seven wells drilling and three new locations according to a recent report. Lewis County has 32 locations and 42 drilling wells. Leasing activity has been lively by both independent and major firms.

The major pay formation in Braxton County is called the Benson sand, located in the Chemung zone of Upper Devonian at 4,150 to 4,300 ft. A gas pay has been found 3 to 5 ft. thick located about 8 to 12 ft. below the top of the sand. The porosity of this sand has been found ideal for fracture treatment. Average natural production is 100 M.c.f. and after fracture treatment the flow is increased from 4 to 10 M.M.c.f. Average rock pressures are in the vicinity of 1,600 psi.

The depletion curve of the wells is rather abrupt for the first 6 months and then they level off gradually, declining for a life of 8 to 10 years. Benson wells show an average return of 12% the first year and in exceptional cases the wells have returned the entire investment in the first 6 months. Average cost of drilling a Benson sand well is $45,000.

The major target in Lewis County is the Big Injun sand located in the Pocono zone of the Mississippian. This is found at 2,100 ft. and is usually 45 ft. thick with the first 12 to 15 ft. the best zone.

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DRILLING BRIEFS

DRILLING MUD DATA — REPORT 61-2

SOLTEX* Reduces Torque, Drag, and Sticking

When introducing our new mud additive a short time back, we talked mostly of SOLTEX's ability to stabilize hole conditions in sloughing shale . . . improving downhole flow properties and fluid loss control, reducing the need for other chemical treatments, and improving oil emulsions. These and other advantages are continuously studied in the lab and successfully verified in the field.

Early in the game, we also realized that SOLTEX might be a natural for reducing torque or drag, and for helping prevent stuck drill pipe. You can't do much with this in the lab . . . so as soon as field testing began, we started taking notes. Sure enough, in well after well SOLTEX did an amazing job of reducing friction and controlling shale. Considerable savings were made possible because of improved hole conditions which resulted in faster penetration rates, rig time saved, and reduced equipment maintenance. Brief accounts on a few of the wells studied are given below.

Sticking and Dragging in Louisiana

While drilling a deviated hole (20°) in Tensas Parish, Louisiana, the bit hit an obstruction at 6,101 feet and stuck. After working the pipe for 6½ hours with no results, the contractor decided to spot oil. While waiting for the pump truck, a treatment of 2½ lbs/bbl of SOLTEX was made over one circulation. Within minutes after the SOLTEX treated mud reached bottom, the pipe came free. No further trouble was encountered.

At a Louisiana Gulf Coast well, the pipe stuck while drilling at 12,400 feet. Three lbs/bbl of SOLTEX were added to the mud, washover operations were started and the fish was recovered with no difficulty.

At one well in South Louisiana, the hole was 8° off vertical and drag was 50-60,000 lbs at 16,180 feet. Five lbs/bbl of SOLTEX were added to the gyp mud over one circulation and drag was practically eliminated. At 16,330 feet, the hole was still drifting but no further drag was experienced.

At another well in the same area, 5 lbs/bbl of SOLTEX were added to control a troublesome shale section which was making it hard to set a whipstock at 7,300 feet. Drag was reduced to less than 10,000 lbs. Three whipstocks were successfully set and hole deviated 30°. The gyp mud used weighed 12.2 lbs/gal.

Tight Hole in West Texas

At 11,780 feet, the hole was off 7½° and drag was 20,000 lbs while pulling off bottom. Slightly over one lb/bbl of SOLTEX was added to a low solids Driscose* mud (11.7 lbs/gal). Torque was reduced and, on the first trip out, drag went down 50%. On previous trips, there appeared to be about 40 feet of fill-up. On the trip after SOLTEX was added, there was none. It is believed that this "fill" was actually friction causing the drill stem to take weight.

Reduce Torque 50% in Oklahoma

At 13,784 feet, 2 lbs/bbl of SOLTEX were added to a 12.8 lbs/gal mud to help stabilize hole conditions. Torque was reduced 50% after the first circulation. Flow properties of the mud improved, pump pressure decreased, and penetration rate improved. A maintenance treatment of 100 lbs of SOLTEX was used on this well during each tour until setting liner at 14,260 feet.

Excessive Friction in California

This well had been sidetracked at 10,000 feet, and hole deviated 23°. Friction had become progressively worse making it necessary to drill in and out of the hole. Approximately 2½ lbs/bbl of SOLTEX were added to the sodium base mud and conditions improved immediately. Treatment was continued as maintenance to final depth and no further trouble was encountered.

• • •

Excessive torque or drag is only one step away from being stuck. Preventative treatments of SOLTEX at the first sign of drag buildup is almost a sure cure that more and more operators are adopting. SOLTEX is usually added in concentrations of from 2 to 6 lbs/bbl, depending upon hole conditions. For more complete information on SOLTEX . . . contact your mud dealer or Drilling Specialties Company representative.

*SOLTEX and Driscose are trademarks for drilling mud additives.

DRILLING SPECIALTIES COMPANY
Bartlesville, Oklahoma

BP'S 80-FT.-TALL drilling rig is shown here above Kimmeridge Bay, near Swanage, Dorset. Structure resembles Paris basin fields.

KIMMERIDGE lies in one of the remoter parts of Dorset.

BP probing England's Kimmeridge shale

LULWORTH COVE, on the south shore of Dorset County, England, has an unusual beauty and is also remarkable geologically for its display of contorted rock formations. It lies on the edge of the Isle of Purbeck, an area of outstanding interest to the geologist because of the part the area has played in the study of the earth's strata. It is at Kimmeridge, 4 miles along the coast from Lulworth, that BP Exploration Co. is currently searching for oil.

The company drilled its first well at Kimmeridge in 1938. Only a small portable drill was available, but contrary to all expectations a depth of 920 ft. was reached, and at least one good oil show was encountered in sandstone. This find could not be tested satisfactorily at the time, and certain other tests in the area failed to find oil. The search for an oil field in southern England returned to Dorset in 1958 as part of an extensive program including Surrey and Hampshire.

A well drilled on the Weymouth anticline improved the prospects for Kimmeridge. The first well drilled there early in 1959 tested the sands in which oil had been found before the war, but with disappointing results. Drilling continued to 1,770 ft. after which an encouraging show of oil was found. This find has been the source of considerable interest, for apart from being the first oil to be discovered in any quantity in southern England and having a rate of flow considerably higher than the wells in the Midlands, it is the first Jurassic oil to be discovered in the country. The structure closely resembles the Paris basin fields where some promising discoveries have recently been made. Three more wells were drilled at Kimmeridge in 1960 to discover the extent of the structure and to test the oil-bearing formation. Oil has been found in one of these wells and the first well has undergone a prolonged production test, but it is not yet possible to make a complete evaluation of the discovery.

Previous Kimmeridge Efforts

Kimmeridge lies in one of the remoter parts of Dorset. Previous efforts have centered on shale deposits which lie above the oil-bearing limestone. The richest of these deposits, known locally as Kimmeridge coal, are called respectively Blackstone which is found in a layer 2 ft. thick, and Bubbicorn, 15 in. thick.

This Kimmeridge shale is a compressed laminated clay generally dark brown in color, containing kerogen, an organic substance which yields oil on distillation. Like coal it is of predominantly vegetable origin. This Kimmeridge shale is part of the Jurassic system of strata which was formed approximately 140 million years ago. The shale in Midlothian which Scottish Oils exploits is considerably older, coming from the Carboniferous system which is about 240 million years old.

At a Royal Commission on coal supplies in 1903, Kimmeridge was mentioned as the source of an estimated 1½ million tons of shale yielding about 50 gal. of oil and 38 lb. of sulfate of ammonia per ton. Interest in the shale revived again in 1912 when the Admiralty specification for fuel oil raised the permitted level of sulfur to 3%, but it still proved impossible to reduce the sulfur content without prohibitive cost. The last activity in the area before the arrival of BP was an extensive survey of the shale deposit carried out by the government in 1917-18, in anticipation of a shortage of oil supplies.

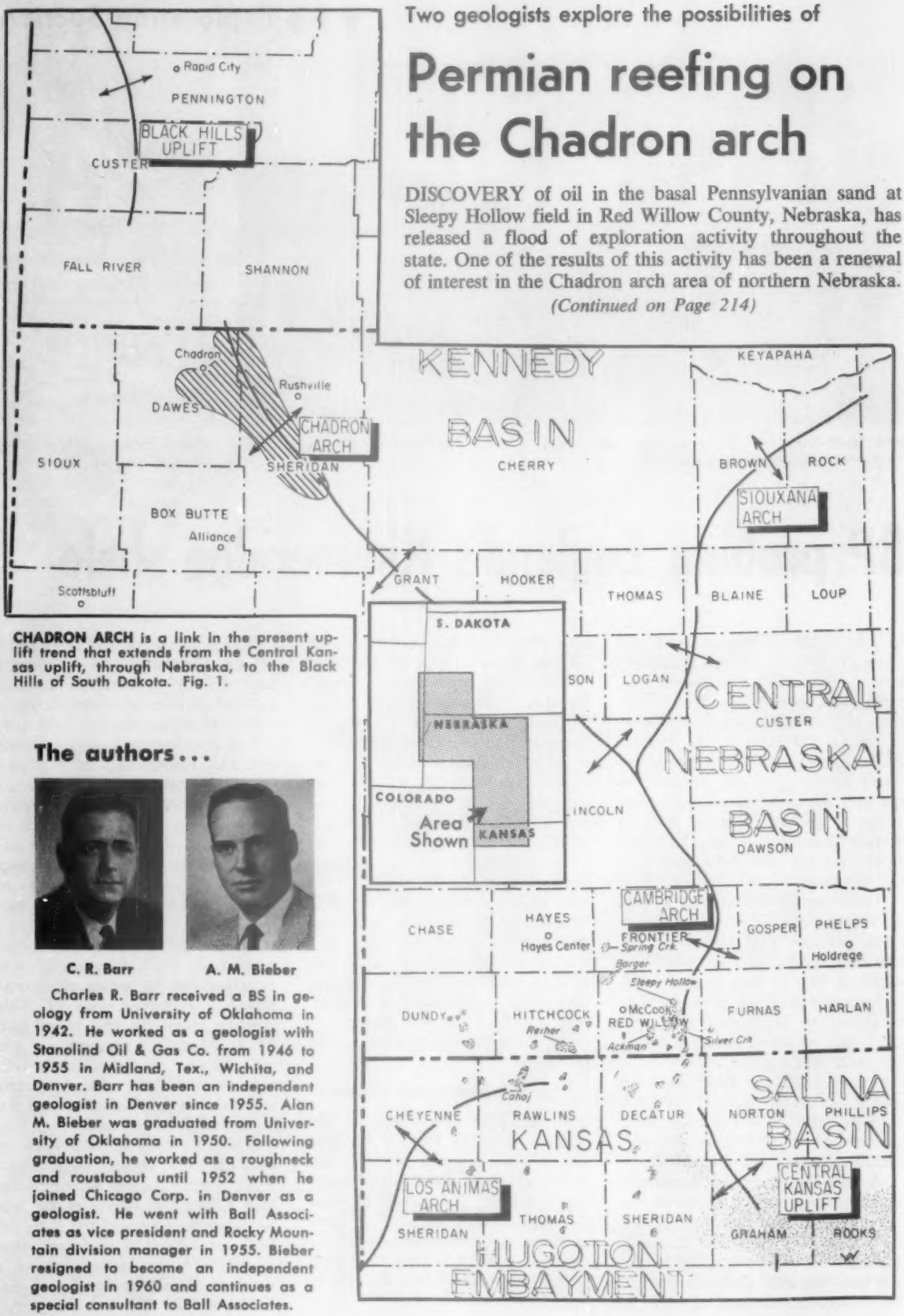
Adapted from BP Shield, June 1961.

Two geologists explore the possibilities of

Permian reefing on the Chadron arch

DISCOVERY of oil in the basal Pennsylvanian sand at Sleepy Hollow field in Red Willow County, Nebraska, has released a flood of exploration activity throughout the state. One of the results of this activity has been a renewal of interest in the Chadron arch area of northern Nebraska.

(Continued on Page 214)



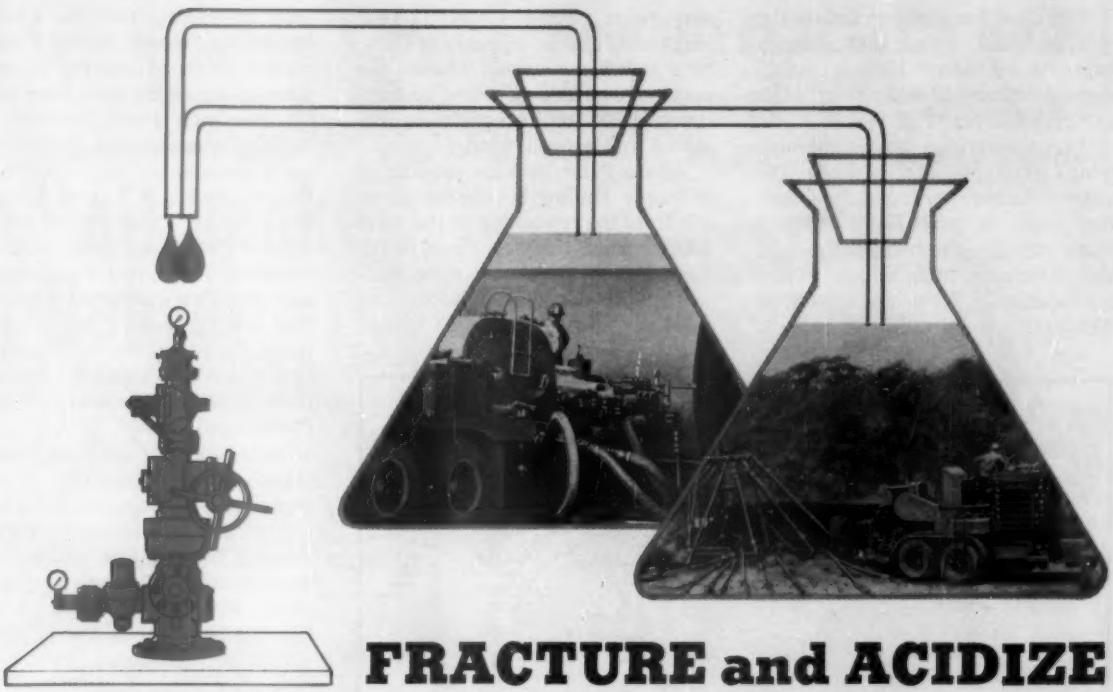
CHADRON ARCH is a link in the present uplift trend that extends from the Central Kansas uplift, through Nebraska, to the Black Hills of South Dakota. Fig. 1.

The authors...

C. R. Barr

A. M. Bieber

Charles R. Barr received a BS in geology from University of Oklahoma in 1942. He worked as a geologist with Stanolind Oil & Gas Co. from 1946 to 1955 in Midland, Tex., Wichita, and Denver. Barr has been an independent geologist in Denver since 1955. Alan M. Bieber was graduated from University of Oklahoma in 1950. Following graduation, he worked as a roughneck and roustabout until 1952 when he joined Chicago Corp. in Denver as a geologist. He went with Ball Associates as vice president and Rocky Mountain division manager in 1955. Bieber resigned to become an independent geologist in 1960 and continues as a special consultant to Ball Associates.



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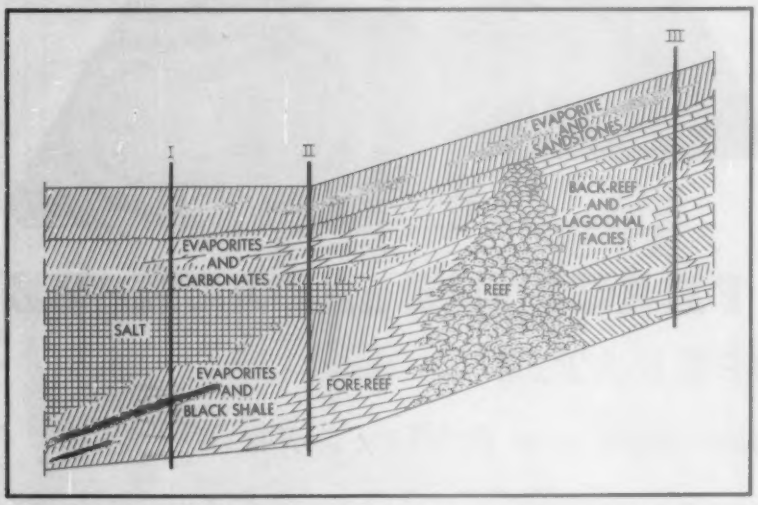
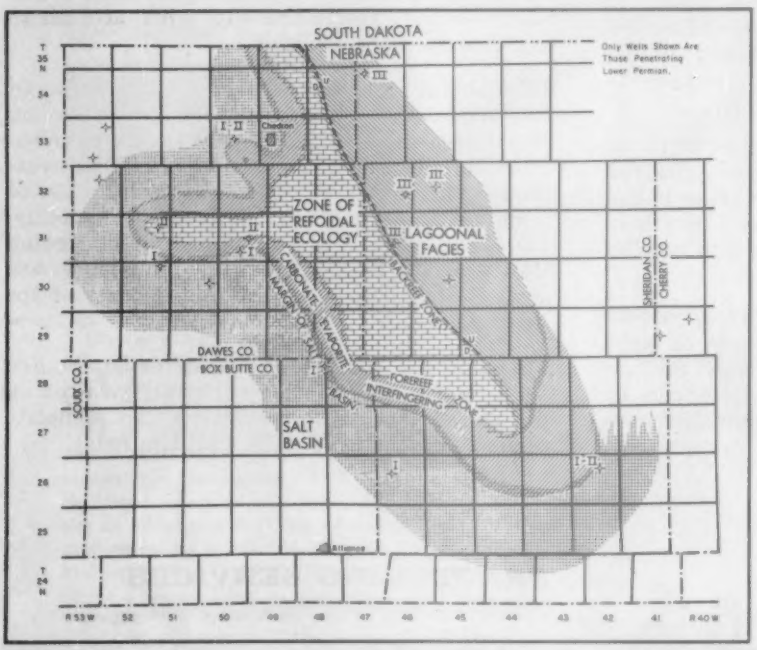
The Chadron arch is a link in the present uplift trend that extends from the Central Kansas uplift, through Nebraska, to the Black Hills of South Dakota (Fig. 1).

The Cambridge arch, although lying geographically between the Central Kansas uplift and the Chadron arch, is probably connected more closely chronologically with the Siouxiana arch which swings northeastward from the center of Nebraska; the important tectonic movements of the Cambridge-Siouxiana arches appear to have been in Paleozoic time, whereas the major movement of the Chadron-Black Hills uplifts probably occurred in Mesozoic time.

As the Pennsylvanian production at Sleepy Hollow is believed to result from the reworking of the basal sands against the west flank of the ancient Cambridge arch, some geologists were reluctant to pursue this trend northwestward to the Chadron arch, presuming that the Chadron feature was absent during Pennsylvanian. Detailed analysis of cross-sections across the west flank of the Chadron arch shows, however, that although the arch was probably not yet a pronounced high area during Pennsylvanian, it was at least the hinge-line of a platform on the east edge of the Pennsylvanian sea, and therefore affected Pennsylvanian and post-Pennsylvanian deposition. The investigation of this effect on post-Pennsylvanian sediments revealed some significant geologic conditions in the lower Permian (Wolfcamp).



A SIMPLIFIED and idealized cross-section shows the lithology from basin to rim (left to right) through a typical peripheral reef in an evaporite sea. Fig. 2.



THREE DISTINCT TYPES of lithological sequences were determined by a study of sample logs in lower Permian wells. These are: I, typical basin sediments; II, sediments encountered moving landward from the basin; and III, a lagoonal facies (see Fig. 2). The distribution of the three lithological types are above. Fig. 3.

At the close of the Pennsylvanian (Missouri-Virgil time), the Pennsylvanian sea had apparently reached a condition of stability, with no marked transgressive or regressive movements. Wells drilled 15 to 20 miles west of the Chadron arch show normal deposition of marine carbonates; the position of the arch as a shelf hinge-line is clearly evidenced by the marked change in these carbonates from their massive, crystalline, buff-colored lithology in the latter wells to the thin, dense, maroon-colored carbonates encountered in the wells on or east of the crest of the arch. This change not only indicates shallower water on the arch, but possibly also a lagoonal environment due to some form of barrier on the west flank.

The beginning of Wolfcamp time, with the first of the great evaporitic cycles characteristic of the Mid-Continent Permian, is marked by the appearance of evaporites above the Pennsylvanian carbonates. In the basinward (westerly) wells these evaporites consist predominantly of anhydrites with some black shales, limestones and dolomites. They become more saline higher in the stratigraphic column, grading into pure halite in middle Wolfcamp. Still higher in the column, the evaporites grade back into anhydrites and then dolomites. This typical evaporitic cyclic occupies a 300 to 500-ft. interval which is terminated in upper Wolfcamp and followed by a persistent evaporite-sandstone sequence which carries through all the wells in the area.

In the wells on the crest of the arch and eastward, the beds equivalent in time to the basin evaporites consist entirely of thin alternating anhydrites, gypsum, dense maroon

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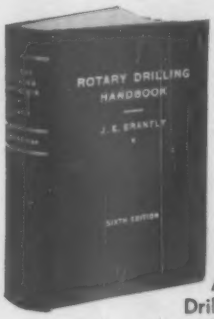

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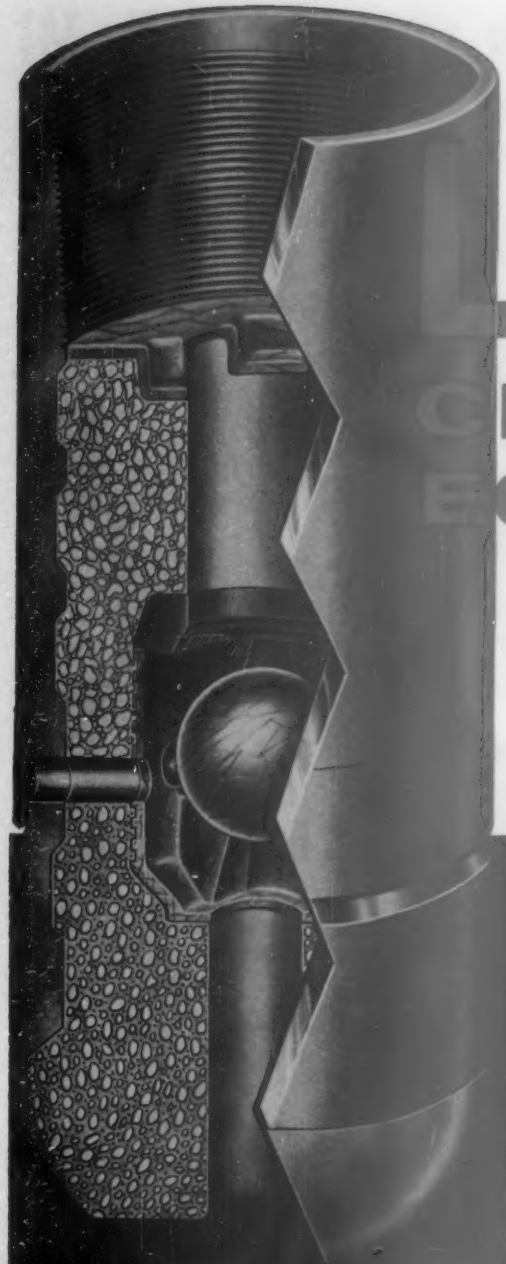

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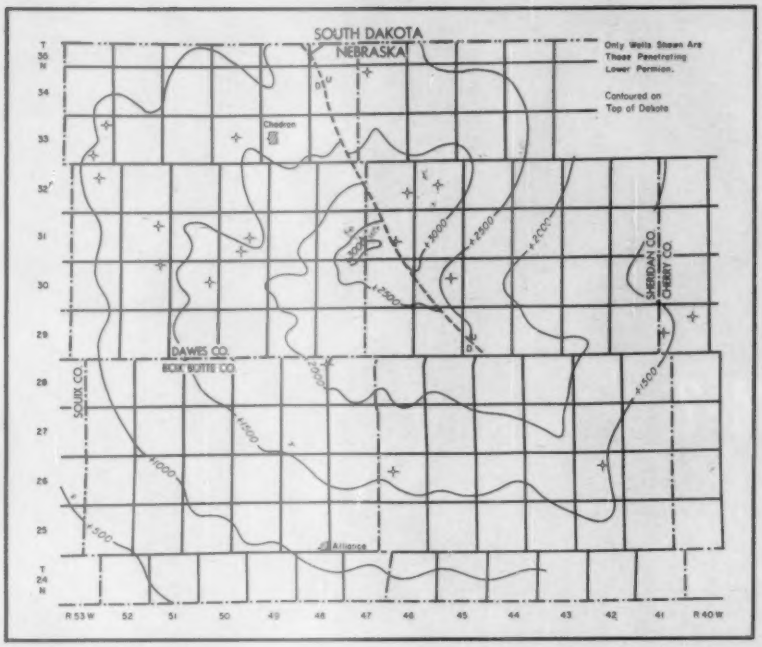


TO DETERMINE the influence of present-day Cretaceous structure (above) on facies distribution (Fig. 3), both maps are drawn to same scale. Fig. 4.

and purple carbonates, red shales, and a few thin sandstones. The presence of these thin, alternating, red-colored beds is strong evidence that the top of the arch was subject to shallow, typical lagoonal deposition.

Interpretation of lithologies encountered in the flank and crest wells led to the following conclusions: First, the area west of the arch was a restricted evaporitic basin during Wolfcamp time, with typical cyclical deposition of sediments associated with arid climatic conditions. Second, the arch itself must have been the margin of this basin, with some indications of a barrier between the crest of the arch and the evaporite sea.

It is well established in geologic literature that the margins of restricted (evaporite) basins during periods of nonclastic deposition present the most ideal ecologic conditions for reef growth. (The persistent and prolific Permian reefs of West Texas and the "hinge-line" Pennsylvanian reefs of the Paradox basin offer visible proof of this doctrine.) The simplified and idealized cross-section (Fig. 2) shows the lithology from basin to rim through a typical peripheral reef in an evaporite sea. (Under more humid conditions, the evaporites and red shales of the lagoonal facies would be replaced by black shales.)

Having established that the Chadron arch area met the broad ecologic requirements for reef growth, a more detailed analysis of the subsurface data available was launched to uncover further clues to possible reefing. A study of the sample logs from all the lower Permian wells in the area revealed that three distinct lithologic sequences were present. These were designated types I, II, and III as indicated in the idealized cross-section of Fig. 2. The wells having each type of lithology are indicated on the facies map of Fig. 3.

Type I lithology consists of typical basin sediments, i.e., anhydrites with a few black shales grading upward into salt, then back to anhydrite. The few carbonates present are scattered through the upper and lower parts of the section. The following wells have Type I lithology:

California Co. 1 Deans, 28-31n-49w.

Potter Drilling Co. 1 Soester, 2-30n-51w.

Shell Oil Co. 1 Wildly, 1-28n-48w.

Lucerne 1 Krause, 17-26n-46w.

Type II lithology is that which would be encountered moving landward from the typical basin lithology. The lower evaporites are largely replaced by dolomites, and the salt facies is very thin or entirely absent. The remaining anhydrites are concentrated in the center section in place of the missing salt, and the upper section shows a marked increase in carbonates. The following wells have a typical Type II lithology:

Fred Morgan 1 Richardson, 11-31n-51w.

Potter Drilling Co. 1 Federal, 22-31n-49w.

Two additional wells—the Texaco-Seaboard 1 Mussler-Mosier, 10-26n-42w, and the Amerada 1 State, 16-33n-49w—have a lithology intermediate between types I and II.

The third group of wells, those having Type III lithology, are characterized by a Wolfcamp section of alternating thin anhydrite, gypsum, thin dense carbonates, and shales. Various shades of red, purple, and maroon predominate, indicating an oxidizing (shallow water) and restricted environment. These wells are the following:

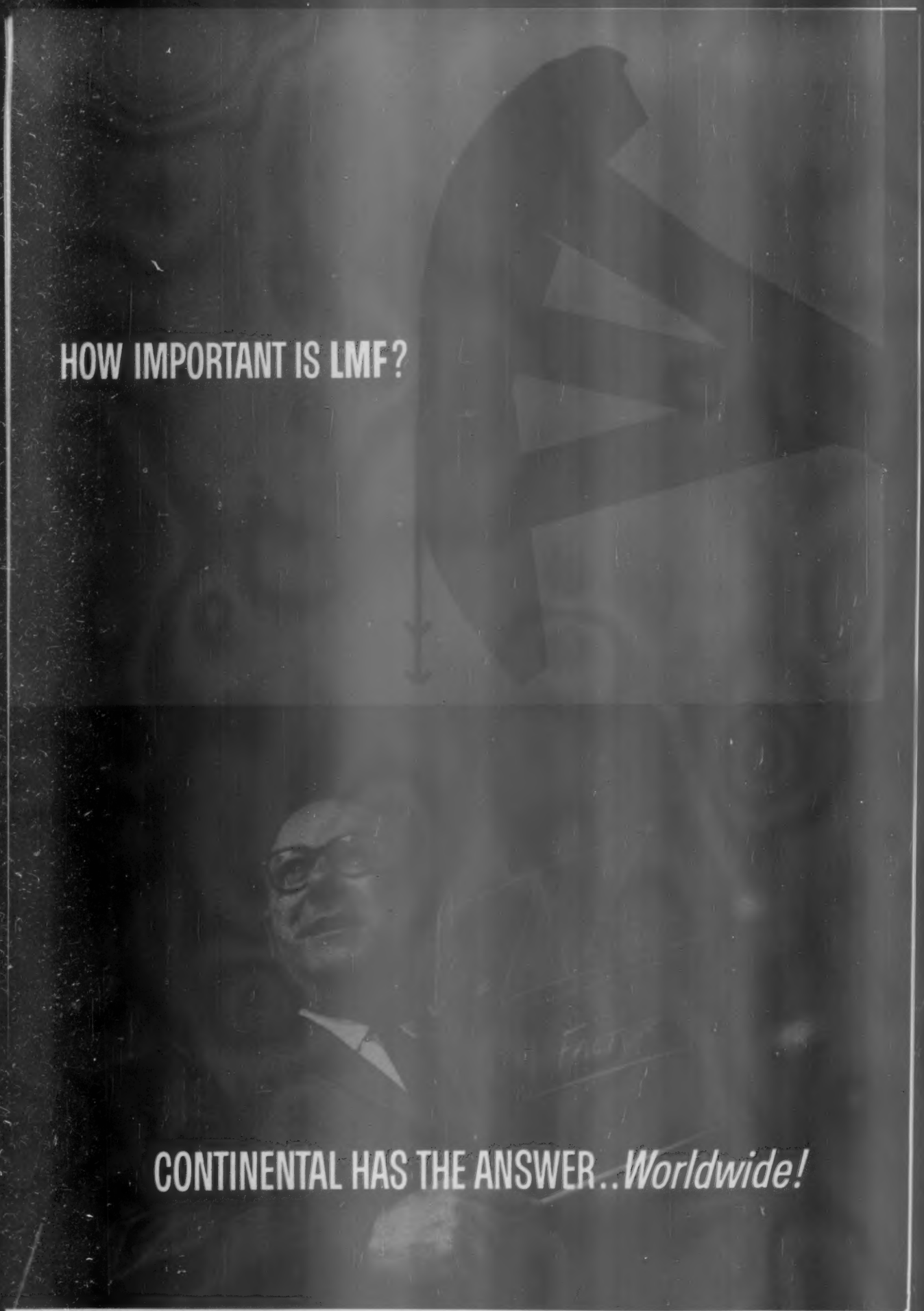
Valentine Oil 1 Murphy, 5-34n-46w.

S. D. Johnson 1 State, 16-32n-45w.

Superior Oil Co. 17-24 Murray, 24-32n-46w.

Ohio Oil Co. 1 Demmer, 22-31n-46w.

The lithofacies map of Fig. 3 illustrates the distribution of the three lithological types based on the above wells. To determine the influence of the structure on facies distribution, present-day Cretaceous structure is shown on the same scale in Fig. 4. The datum used was the top of the first Dakota sandstone at a depth of approximately 2,000 ft. This horizon was selected because a much greater number of wells had penetrated this zone than had penetrated the Permian at 4,000 ft. The results support the premise that present-day structure is an exaggerated reflection of Paleozoic-time structure. The westward extension of the reefoid facies shown on the facies map coincides with a bulging structural anomaly on the Cretaceous map, suggesting a rib had extended westward from the arch into the Permian sea. This is further borne out by the increase in evaporites in the reentrant on the northwest flank of the arch coinciding with a present-day syncline. Also, the evaporites appear to carry across the arch south of the present fault where the present-day struc-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ture is most gentle, indicating that the relief on the southern end was also slight during Permian time.

Having determined that the ecologic conditions were suitable for reef growth, and that the arch was active in Wolfcamp time and had apparently influenced deposition, it remained to determine if other more direct evidence of reefing could be found. As the lithofacies map shows, no Permian tests have been drilled in an area of anticipated reefing about 10 miles wide and extending almost 50 miles along the flank of the arch; only two wells have been drilled in what might be expected to be the forereef zone.

As most reefs of Permian age were constructed by coralline algae, the fact that these latter two wells contain substantial quantities of algae in the lower Wolfcamp is highly significant. It clearly rules out the possibility that hypersalinity detrimental to organic growth might have been present in the Wolfcamp sea. The lower Wolfcamp carbonates, though highly dolomitized, are reported to contain a few fossil casts along with numerous oolite zones. The occurrence of oolites in close association with limestone reefs is reported in the geologic literature. The scarcity of fossil remains is not significant, as the Permian-Abo reef of the Delaware basin has noticeably few fossil assemblages even in the actual reef facies. Dolomitization and re-crystallization probably destroyed most of the Permian fossils in the Chadron area.

Other environmental factors that influence reef growth are depth of water, climatic temperature and sunlight. We can assume that, as algal reefs can build in water up to 100 ft. deep, and as the lagoonal-type beds on the crest indicate depths far shallower than this, there must have been at least one zone on the flank where the depth of water was ideal for reef growth. The proper climatic conditions may be presumed to have existed, as the Chadron arch is only about 600 miles north of the tremendous Permian reefs of New Mexico and only about 250 miles north of a Permian reef reported near Fairplay, Colo.

In summary, there are the following indications that Permian reefing may be present on the west flank of the Chadron arch:

1. Basin sediments are typical of a restricted arid basin environment, ideal for marginal reef growth.
2. The rapid change from salt to anhydrite to shelf carbonates to lagoonal evaporites and carbonates indicating that the arch was the margin of the evaporative basin. This is further substantiated by the correlation between present-day structure and Wolfcamp facies changes.
3. The lagoonal-type facies on the crest, indicating a barrier existed between the crest and the basin.
4. The numerous algae and oolites in the downdip carbonates, which are often associated with limestone reefing.
5. The presence of other Permian reefs in almost the same latitude, indicating favorable climatic conditions.

As an untested band 10 to 15 miles wide and 50 miles long exists between the carbonate-bearing flank wells and the lagoonal crest wells, it may take several tests to prove (or disprove) the presence of reefing. Marginal (barrier) reefs such as the Abo reef are often less than 2 miles wide, but their prolific productivity makes them worthwhile exploration targets.

Some geologists may ask whether a reef can contain oil unless it was deposited in close association with black shale source beds. The authors feel, as do many others, that the abundant organic material in and around a reef is sufficient for in situ generation of hydrocarbons. This is apparently responsible for many otherwise inexplicable oil accumulations in ancient reefs. Also, there are several oil shows in both the flank and lagoonal Wolfcamp carbonates of the Chadron arch, indicating some source material exists. The presence of these shows, combined with the indications of Permian reefing at relatively shallow depth, makes the Chadron arch an intriguing exploration target.

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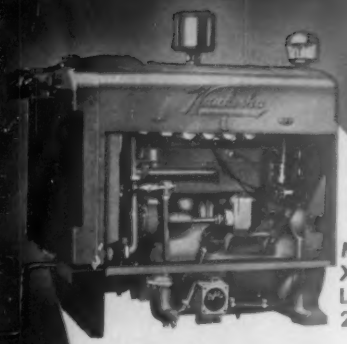

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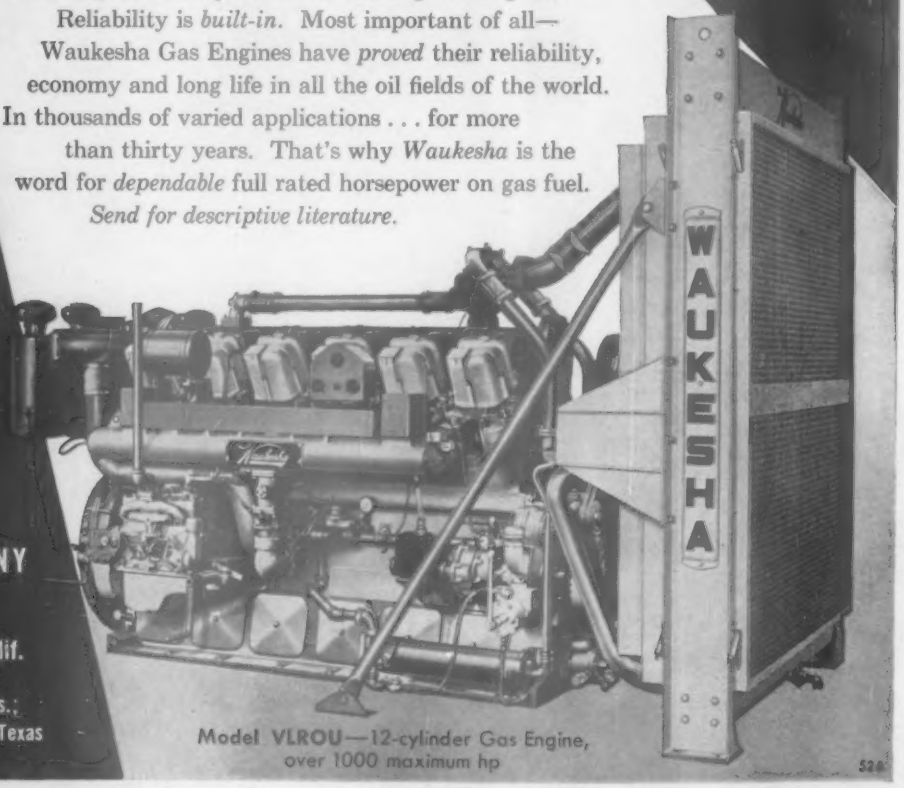

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West Colorado wildcat finds gas in Dakota sand

A new Dakota gas-discovery is indicated in western Colorado's Mesa County. It is 12 miles southeast of Hunters Canyon field, one of the county's more important fields. Nearest other production is a small shallow Corcoran gas-discovery well completed in 1960.

The new discovery well is Ambassador Oil Co.'s 1 Federal-Colorado-C, in 35-9s-99w. It topped the Dakota section at 6,136 ft. First test at 6,216-28 ft. flowed at the rate of 936 M.c.f. of gas daily through 1-in. choke.

Next test, taking in a slightly deeper interval at 6,232-40 ft., flowed at the rate of 1,040 M.c.f.d.

Original plans called for a test to the Entrada test with depth prospective of 6,800 ft.

Another spot produces in Texas' Jim Wells County

Another oil-productive area has been opened in South Texas' much drilled Jim Wells County.

Discovery well, drilled by C. C. Winn, is 2 miles southwest of Orange Grove, in the northern part of the county.

The well, 1 Hartman, flowed 32 bbl. of 50.2°-gravity oil per day through 8/64-in. choke. Flowing pressure was 400 psi., and gas-oil ratio 988 cu. ft. per barrel.

Widespread discoveries enliven Michigan play

New pool prospects have Michigan operators on the run. Probable discovery wells are on test in Mason, Lenawee, and St. Clair counties.

Miller Brothers 1 Shaffer, NW SE NE 14-18n-17w, in Amber township, 5 miles north of Riverton pool, drilled Traverse lime oil pay at 1,647-50 ft. and will run 5-inch string.

In Lenawee County, 15 miles southeast of the south end of the Albion-Scipio trend, Good and Good 1 Beal, NE NW SW 3-8s-1e, showed 300 M.c.f. of gas and flowed oil to pits after 64 hours from the Trenton section at 2,897-2,927 ft. Basin Oil Co., Sun Oil Co., and Ohio Oil Co. are the biggest lease holders.

Also in Lenawee County but 30 miles northeast of the Good and Good wildcat, McClure, Bell & Marks and Basin Oil Co. 1 Smitka, SE SE SW 23-5s-5e, southwest offset to a still testing discovery well, drilled gas and oil pay in Trenton at 2,523-2,534 ft. Well was killed to set 5-in. string before deepening. Jay White and Max Pray (who set up the original test on a 4,400-acre block), Pan American Petroleum Corp., Sun, Ohio, and Basin have acreage in the area.

St. Clair County, where there have been a half dozen new gas and oil discoveries since the first of the year, has produced still another reef prospect. McClure Oil Co. I. W. Hartman and Panhandle Eastern 1 Stark, C SW NE 28-4n-16e, China township, 2 miles southwest Bell River gas pool, cable tool tested 440 M.c.f. of gas in Niagaran section at 2,467-87 ft.

Dual-zone oil discovery opens new Louisiana field

Completion of a dual-zone discovery well 5 miles east of Arnaudville field, in northern St. Martin Parish, Coastal Louisiana, is reported by Wacker Oil Co., of New Orleans.

The well, 1 Edwin E. Willis, is productive of oil from its lower zone, perforated at 9,694-97 ft. Its upper zone, perforated at 9,654-58 ft., produces gas and condensate.

Oil flow tested at the rate of 300 bbl. daily through 10/64-in. choke. Flowing pressure gaged 2,650 psi. Gas-oil ratio was 2,310 cu. ft. per bbl. Gravity of the oil is 43.6°.

The upper zone flowed at the rate of 1,840 M.c.f.d. of gas with 96 bbl. of 59.6°-gravity condensate through 10/64-in. choke. Pressure registered 3,145 psi.

Ohio gets good gasser

A semiwildcat test drilled by Oxford Oil Co. in northwestern Springfield Township, in Muskingum County, Ohio, has come in as a good gas well.

It is the company's 2 Clarence F. Perine, in Section 7. It gaged 2,709 M.c.f.d. of gas after cleaning and being open 7 hours. Twelve-hour rock pressure was 1,040 psi.

Its Clinton sand, at 3,487-3,525 ft., was stimulated by water fracturing.

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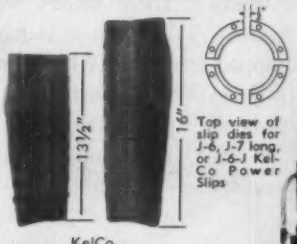

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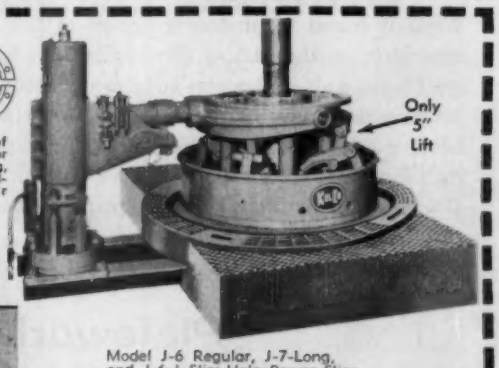
Top view of slip dies for J-6, J-7 long, or J-6-J Kel-Co Power Slips



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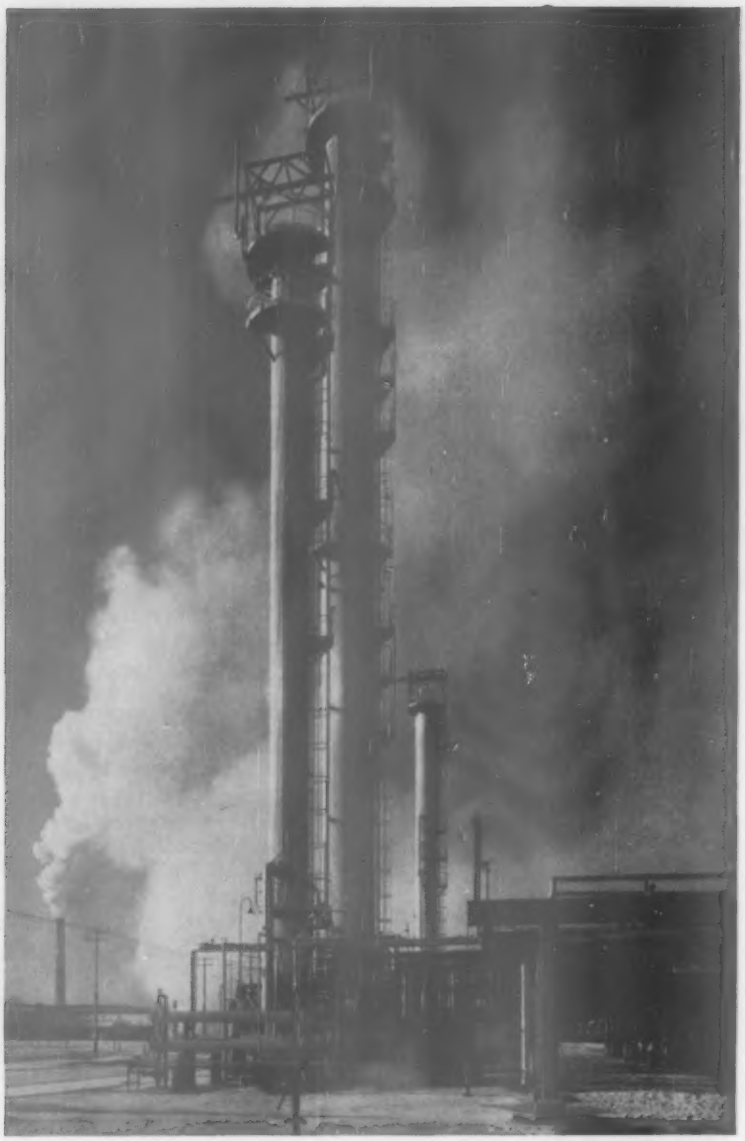

Towers for Texaco

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These towers were fabricated by the Platework Division of Dominion Bridge to designs supplied by Foster Wheeler and are typical of hundreds that Dominion Bridge has made for the oil and chemical process industries.

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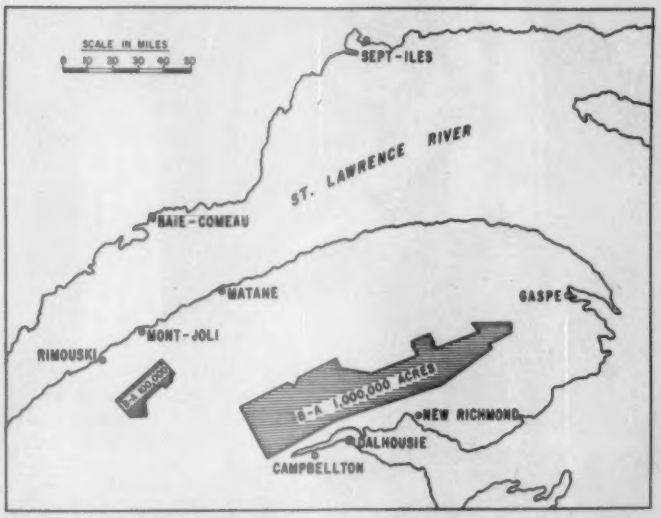


GASPE PENINSULA, in Canada's province of Quebec, is the scene of a stepped-up seismic exploratory program by British American Oil Co. Shown are locations of the company's 1,000,000-acre permit in the New Richmond area, and the newer 100,000-acre permit at Mont-Joli.

DEEP in the rugged and heavily forested Gaspe Peninsula of Quebec, a seismic crew for British American Oil Co. is standing by a detonated shot on the company's Mont-Joli 100,000-acre permit.

BA seismic survey under way in Gaspe

IN the Gaspe Peninsula, British American Oil's seismic crew has moved from the company's 1-million-acre permit in the New Richmond area to begin evaluating new acreage near Mont Joli. BA has taken out a permit for 100,000 acres in this latter area.

The company's current program marks the first major attempt to carry out a seismic survey in the rugged terrain of the Gaspe.

British American began geological field work in the Gaspe in 1958 and studies have continued through the past two summers. Although the lack of roads and recent heavy rains have slowed seismic activities, the company reports it is still pressing its present program.

BA's seismic activities in the province of Quebec are part of British American's stepped-up exploration program in eastern Canada. For the past 2 years the company has been carrying on exploration activities in western Ontario.

Two new Wind River fields opened

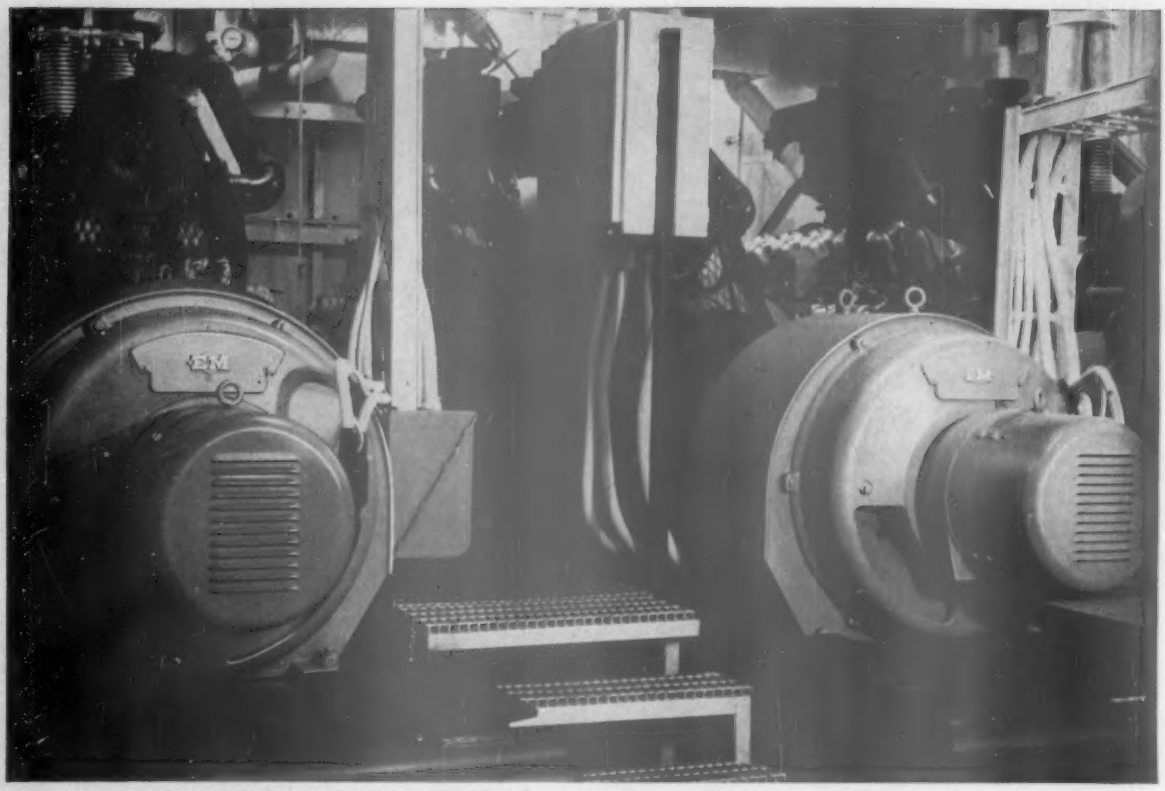
TWO NEW FIELDS, 25 miles apart, have been opened in close succession by Humble Oil & Refining Co., in Fremont County, in the heart of Wyoming's active Wind River basin. Both are productive of gas and condensate from the Tertiary-Fort Union formation.

Discovery well of one, on the company's Frenchie Draw unit in the northeastern part of the county, is completed in three separate zones. They are in the lower Fort Union between 9,101-9,891 ft. Intervals perforated are 9,831-91 ft. with 24 ft. of net pay; 9,241-75 ft. with 19 ft. of net pay; and 9,101-33 ft. with comparable thickness.

Daily flows from the respective zones were: 5,074 M.c.f. of gas and 60 bbl. of condensate; 5,055 M.c.f. of gas with 57 bbl. of condensate and 24 bbl. of water; and 4,220 M.c.f. of gas with 60 bbl. of condensate and 36 bbl. of water.

The other discovery well, on the Poison Creek unit, due west of the Frenchie Draw unit, is completed in a single zone higher in the section with perforations at 5,418-32 ft. Its flow in a 24-hour test was 2,447 M.c.f. of gas with 8 bbl. of condensate and 2 bbl. of water. Calculated absolute open-flow potential is 2,600 M.c.f.d. of gas in this Wind River well.

Discovery on the Frenchie Draw unit is 9 miles from nearest production. That is in the Lost Cabin field, northwest of the unit, and on the Squaw Butte unit, to the southwest.



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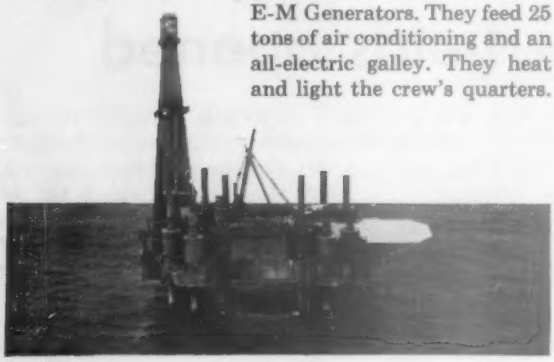

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Call your nearby E-M Field Engineer for further information. He'll be glad to help you with any offshore a-c power problems you may have. Also, write the factory for a-c generator Catalog Sheet No. 259.

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Connecting link indicated for two Wyoming fields

An indicated oil well in the gap between Ant Hills and North Ant Hills field in Niobrara County, Wyoming, may be a link in connecting the two fields.

Ranger Oil Co. is reported to have swabbed at rates up to 44 bbl. per hour from its 2 Government wildcat in the gap. Recovery in one 10-hour period totaled 384 bbl. Swabbing did not lower the fluid level below 200 ft. from the surface.

Pumping equipment will be set up to complete the well.

The oil is coming from Dakota sand, perforated at 4,818-33 ft.

155,000 acres released for oil and gas leasing in Washington

THE State of Washington recently opened up 155,000 acres of previously withdrawn state lands for oil and gas leasing. Most of the land is in the coastal counties of Grays Harbor, Jefferson, Pacific, and Island counties with some acreage also in the hinterland counties of Wahkiakum, Cowlitz, Lewis, Benton, and Grant counties.

Offshore lands now available for leasing include approximately 20,000 acres in Grays Harbor County, 25,000 acres in Pacific County and approximately 9,000 acres in Jefferson County.

Major interest is developing in the coastal area of Washington and it is anticipated that much of the acreage now open for leasing will be shortly put up for public auction.

Publication on Oregon, Washington stratigraphic names now available

Dr. Walter Youngquist, professor of geology at the University of Oregon, Eugene, has recently published an "Annotated Lexicon of Names Applied to Tertiary Stratigraphic Units in Oregon and Washington West of the Cascade Mountains, with Bibliography." The publication is an excellent summary of formation nomenclature and would be of tremendous aid to anyone confronted with the task of unraveling the maze of names applied to Tertiary stratigraphy in Oregon and Washington. The publication also includes correlation charts. Price of the publication is $3 per copy and can be obtained from Dr. Youngquist at Box 5201, University Station, Eugene, Ore.

Oil production takes long Nebraska jump

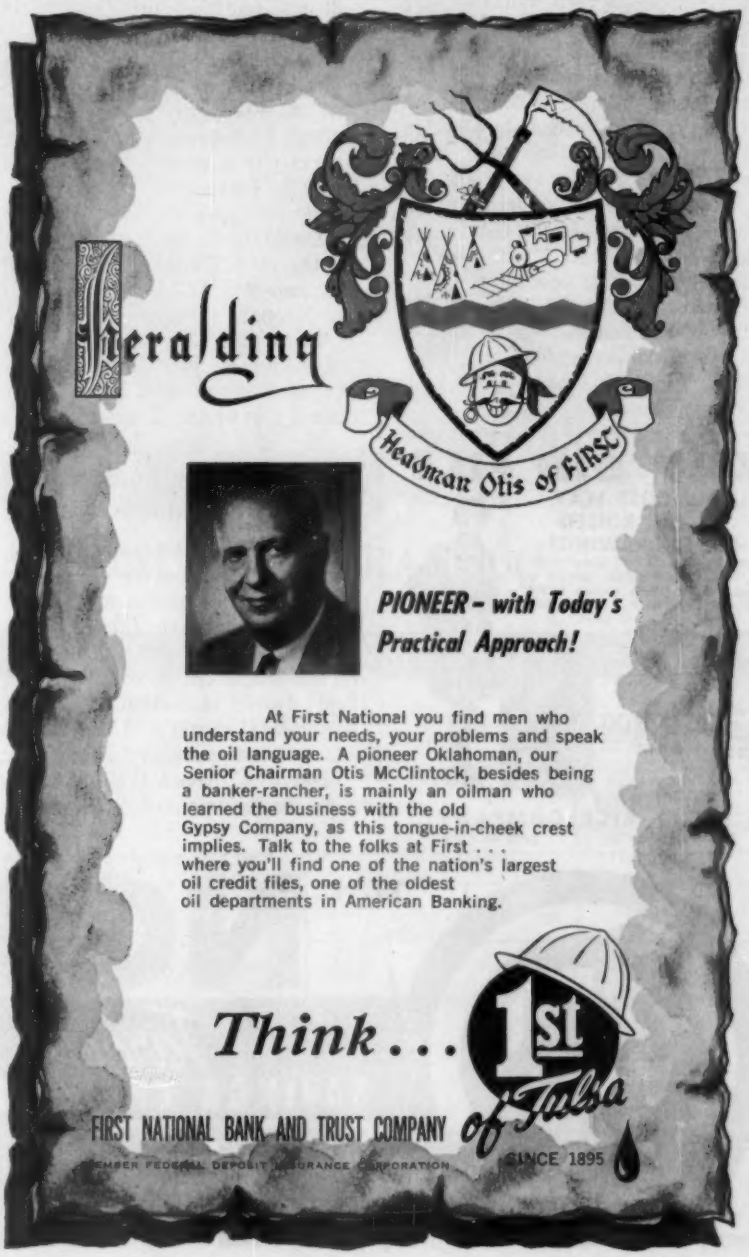
Confirmation of reports of oil recoveries in the rank wildcat drilled by Mast Drilling Co., and Chieftain Petroleum Co. in Lincoln County, Nebraska, gives assurance of first production in that county.

The wildcat, 1 Melton, got 120 ft. of oil and 840 ft. of oil and gas-cut mud, along with 1,100 ft. of salt water in a 60-minute drill-stem test in Cherokee sand at 4,488-4,501 ft.

A second test slightly deeper in the pay at 4,504-33 ft. did even better. It recovered 300 ft. of oil and 120 ft. of oil and gas-cut mud with 180 ft. of oil-cut salt water.

Flowing pressure during the test rose from 130 to 395 psi.

Oil-string has been run to 4,482 ft., 1 ft. off bottom. Rotary tools have been moved off to be replaced by smaller completion tools.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South Mississippi adds Lower Cretaceous field

Completion is reported on Triad Oil & Gas Co.'s new Lower Cretaceous discovery well in the northwest corner of South Mississippi's Jones County.

The well, 1 E. S. Gambrell, flowed 275 bbl. of 19°-gravity oil per day through ⅜-in. choke. Tubing pressure was 90 psi., and gas-oil ratio 300 cu. ft. per bbl. No water was present.

Pay zone is in the Washita-Frederisksburg section, perforated at 9,460-98 ft. Net effective pay totaled 34 ft.

Summerland has been designated as the new field's name.

Completion ends a long period of testing of numerous showings in several horizons. Hole had been drilled to 12,502 ft.

Testing also is under way at another indicated Lower Cretaceous discovery less than 7 miles southeast, in the same county.

There, Sinclair Oil & Gas Co. 1 Hinton, with casing run to 13,477 ft., has initial perforations at 13,004-14 ft. Flow of 3 to 5 bbl. of oil per hour is reported. Flowing pressure registered 260 psi., and gas-oil ratio 861 cu. ft. per bbl. Gravity of the oil is 43.4°.

Promising oil showings were logged in a series of zones below 11,000 ft.

Location is 1¼ miles east of Lower Cretaceous production in Gitano field.

Dual oil-discovery expands North Texas Regular area

Mississippian oil production has been opened in a stepout wildcat a half mile southwest of Regular field in Young County, North Texas.

The discovery is by Texaco Inc., in its 1 Hinson, which flowed 135 bbl. of 40.6°-gravity oil per day through 12/64-in. choke. Its Mississippian pay is perforated at 4.912-5,010 ft. Total depth is 5,400 ft.

The well also is productive from the shallower Caddo formation, perforated at 4,572-80 ft. Flow from that zone was 62 bbl. in a 16-hour test through 16/64-in. choke.

A dual completion is being made.

Location is about 5 miles northwest of Jean township in the north-central part of the county.

Upper Morrow field opened in Texas Panhandle area

An upper Morrow Pennsylvanian sand discovery was completed 20 miles southeast of Perryton in southeastern Ochiltree County, Texas Panhandle. The well is Shamrock Oil & Gas Corp. 1 Pearl Turner in Section 303, Block 43, H&TC Survey. There is no nearby production.

The well flowed 6,200 M.c.f.d. from perforations at 9,276-85 ft.

Roberts County. A Wolfcamp Permian gas well is reported at Texaco Inc. 1 R. A. Flowers, 10 miles northeast of Miami.

The well had a calculated absolute open flow of 1,200 M.c.f.d. from perforations at 4,177-4,212 ft. Location is 6 miles north of Gulf Oil Corp.'s 2 Marion Osborne, a dual gas discovery in Red Deer field. Texaco's well spots in Section 5, BS&F Survey.

Deep Wilcox oil found in Southeast Texas Call area

A wildcat drilled by Robert Mossbacher and Trunkline Gas Co. ¾ mile south of Call field in Newton County, southeastern Texas, has proved oil-productive in deep Wilcox sand.

Although not gaged, a substantial flow of oil was reported while cleaning through 16/64-in. choke. Flowing pressure registered 150 psi.

The Wilcox pay is perforated at 10,165-75 ft. with total depth of hole at 11,021 ft.

The well, 1 White-West is less than a half-mile west of a Yegua-sand oil discovery made last November by Ada Oil Co. and designated as the Ada-Call (Y-5) sand field. Its pay is perforated at 6,842-45 ft.

The area is 2 miles southeast of Call, and about 7 miles northeast of Buna.

Two oil pays produce in Texas' Concho discovery

An exploratory well in Concho County, West Texas, has tapped oil production in two horizons—the Pennsylvanian-Strawn sand and the Bend Conglomerate.

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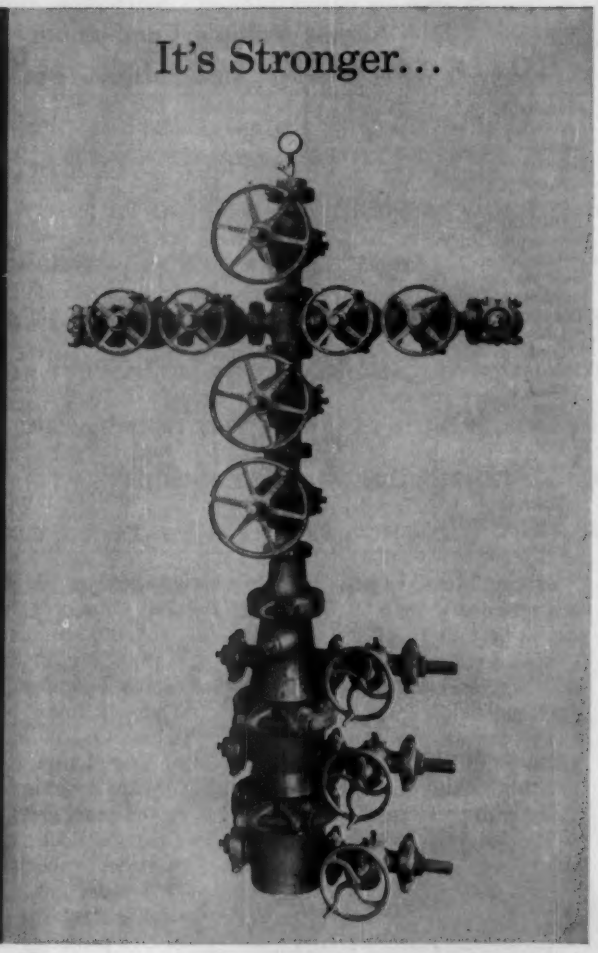

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August Multiple Completions

	Dual	Triple	Quadruple	Total new reservoirs—Oil	Gas	Total
Arkansas	4				8	8
Colorado	2	1		2	5	7
Kansas	3			4	2	6
Louisiana	32	11		73	24	97
North	2	1		1	6	7
South	19	3		36	11	47
Offshore	11	7		36	7	43
Mississippi	1	1			5	5
Nebraska	1			2		2
New Mexico	8			2	14	16
Oklahoma	21	3		40	11	51
Texas	30	8	2	67	25	92
Dist. 1	1				2	2
Dist. 2	6	3	1	19	6	25
Dist. 3	4			6	2	8
Dist. 4	5	1	1	6	11	17
East	3	1		9		9
West	7	3		19	4	23
Dist. 9	4			8		8
Wyoming	3			3	3	6
Total U. S.	105	24	2	193	97	290
Total multiple	131					

Sunray Mid-Continent Oil Co.'s new discovery well, 1 Ella Houston, in Section 1, AB&M Survey, is 3 miles southeast of Paint Rock. It is 1½ miles southwest of the Paint Rock gas field.

The Strawn pay is perforated at 3,456-64 ft. From it, the well flowed 117 bbl. daily through 11/64-in. choke with pressure of 350 psi.

The Bend Conglomerate is perforated at 3,720-26 ft. It is pumping 31 bbl. daily.

Sunray Mid-Continent has another new Concho County oil well—its 1-A Carter, in the Carl Schartz Survey 276. Also a dual completion, the well is pumping 14 bbl. daily from Canyon pay at 3,197-3,203 ft., and 106 bbl. daily from Strawn sand at 3,571-79 ft.

Fourth company enters Oregon offshore picture

Standard Oil Co. of California has become the fourth company to receive permit for exploration in the Pacific Ocean off the coast of Oregon and Washington.

Its permit, received the past week, allows the company to conduct gas-exploder seismic work offshore from Oregon for a period of 1 year from September 1, 1961.

Standard's entry into the offshore exploratory picture of the Northwest Pacific states strengthens the prospects for an extensive evaluation of Oregon coastal basins, according to the Northwest Oil Report.

Other companies previously granted permits for exploration in Oregon offshore areas are Shell Oil Co., Gulf Oil Corp., and Union Oil Co.

Shell also has recently received permits for offshore seismic exploration within Washington waters. These permits cover two general areas. One is the approximate area of Destruction Island, where work already is getting under way. Work in the general Puget Sound-Strait of Juan De Fuca area is scheduled to start September 5.

A sister company, Shell Oil Co. of Canada, is expected to tie into Shell's projected survey in the Strait of Juan De Fuca with proposed exploration farther north off the west coast of Vancouver Island and in Queen Charlotte Sound. Permit has been applied for.

Discovery wells

ALASKA

Sterling unit:
Union Oil Co.-Ohio Oil Co. et al. 23-15 Sterling unit, SE NW SW 15-5n-10w Flowed 5,900 M.c.f.d. from Kenai formation at about 5,200 ft. TD 14,832 ft. Gas discovery on unit.

CALIFORNIA

Colusa County:
Shell Oil Co. 27-9 Cameron Schohr, center of SW¼ 9-13n-1e. Flowed 9,000 M.c.f.d. from series of perforations in Upper Cretaceous Forbes sands between 8,492-8,561 ft. through 24/64-in. choke. TD 9,261 ft. Deeper pool discovery in Kirk gas field and 7,500 ft. northwest of Kirk.

Sutter County:
Atlantic Oil Co. 1 Epperson, NW NW SE 19-15n-2e. Flowed 8,500 M.c.f.d. from two zones betwen 5,800-58 ft. and 6,020-50 ft. in Upper Cretaceous F zone. TD 7,150 ft. Discovery well in East Grimes field, 1½ miles south of Sutter field and 2¾ miles northeast of Grimes field.

COLORADO

Morgan County:
H. L. Hunt 25 Huey, C E½ W½ 26-2n-56w. IP 580 M.c.f.d., 2 BCPD, 14/64-in., TP 700 psi., shut-in 1,130 psi., perf. 5,110 14 ft. and 5,119-27 ft., J sand. TD 5,170 ft. New-field discovery.

Weld County:
DeVaughn Oil & Gas Co. 1 Thomas, SE SW 31-7n-58w. IP 24 BOPD and 200 M.c.f.d., perf. 6,459-63 ft., D sand. TD 6,570 ft. (OWWO). New-field discovery.

ILLINOIS

Jefferson County:
Burrell G. Minor 1 Ellis, SE SE SW 9-1s-4e. IP 162 BOPD, 2,806-14 ft. TD 2,900 ft. New oil discovery.

St. Clair County:
Wm. H. Krohn 1 Kunkelmann, NE NW 20-2s-7w. IPF 350 M.c.f.d., Cypress 256-62, 281-88 ft. TD 311 ft. New Athens pool discovery.

Shelby County:
M. H. Richardson 2 H. H. Hoskins, SE SE NE 21-10n-4e. IPP 114 BOPD, 8 BWPD, Paint Creek sand 1,694-1,714 ft.; Benoist 1,741-54 ft., Aux Vases 1,771-1,831 ft. TD 1,922 ft. Opens Mode pool.

KANSAS

Kiowa County:
Aylward Drilling Co. and Kenneth Rupp 1 Graves, NE SW NE 9-29s-18w. IPF 3 M.M.c.f.d., Mississippian 4,922-50 ft. TD 5,006 ft. New gas discovery.

KENTUCKY

Daviess County:
J. J. Hassler 1 S. C. Erwin, 3-N-27. IP 95 BOPD, Jackson 1,733-44 ft., Paint Creek 1,858-69 ft. TD 1,867 ft. Opens North Jolly field.

Fisher-Beane 1 Byrl Potts, 6-Q-31. IP 25 BOPD, Jax 954-77 ft. TD 984 ft. Opens North Maceo pool.

SOUTH LOUISIANA

Jefferson Parish:
Texas Pacific Coal & Oil Co. 1 Anaise Christen, 2-16s-23e. IPF 240 BOPD, 1/10% b.s. and w., 124 M.c.f.d., 10/64-in. choke, TP 1,100 psi., 34.5°, GOR 1,513:1, 11,816-26 ft. TD 12,625 ft. PB 11,885 ft. Dual oil and gas discovery.

Plaquemines Parish:
John W. Mecom 1 Unit "S" LL&E Lease 2,435 and 2,414, 37-19s-27e. IP 341 BOPD, 70% water, 9/64-in., 36°, TP 8,400 psi., GOR 1,847 cu. ft. per bbl., perf. 16,678-88 ft. TD 20,598 ft. New-pay discovery in Lake Washington area.

MICHIGAN

Calhoun County:
Sun Oil Co. 1 Walter, SE NE SE 22-1s-5w. IPP 102 BOPD and 200 BWPD, perf. 3,060-80 ft., Salina A-1, TD 4,839 ft. (PB 3,088 ft.). New pay in Cal-Lee Trenton pool.

Oceana County:
Flory Drilling Co. 1 Hill, SW SW NW 26-15n-16w, Elbridge Township, 4 miles east Hart pool. IP 85 BOPD. Elev. 885, Traverse lime pay 2,113-4 ft. TD 2,114. New oil pool.

St. Clair County:
Fain-Porter Drilling Corp. 1 Neuman, NE SW NE 18-7n-13e, Mussey Township, 8 miles north Berlin oil pool. IP 4,700 M.c.f.d. Elev. 820, A-1 4,470, Brown Niagara 4,575. Perforations 4,575-81 ft. TD 4,636. New gas pool.

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You'll find the Kemp Carburetor automatically pre-mixes and keeps gas and air at the exact mixture you wish. And no matter what the total demand or pressure changes in your supply line, this precise air-gas ratio is maintained at all times.

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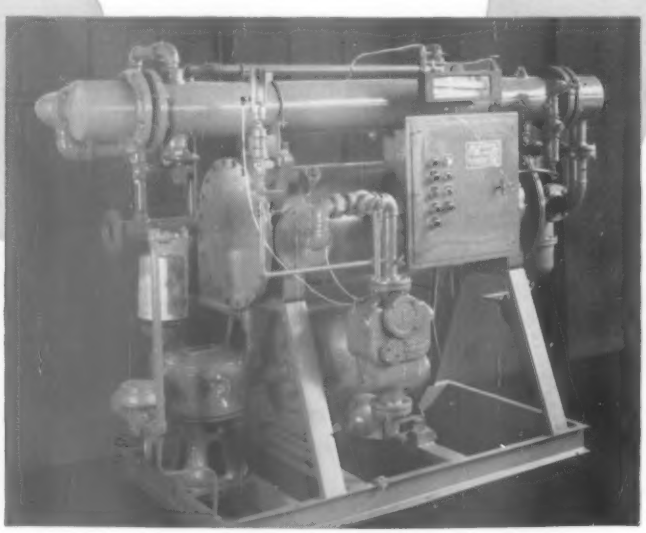

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Old-Time Wildcatting Can Pay

. . . at least as it's done by Aztec Oil's Van Thompson. His aggressive policies have helped set new company records.

THERE are still some old-time rank wildcatters around—and some successful ones, too—if you know where to look.

Aztec Oil & Gas Co. in Dallas, for instance, has one.

He is Van Thompson, 53-year-old president of the company.

Thompson is one of the prime reasons why Aztec keeps setting new company records for production and net income at a time when a great many of its competitors are suffering declines.

Thompson has been a persistent rank wildcatter. And he has made it pay.

Just 7 years ago, Aztec's net oil production was only 548 bbl. daily. Now it is running about 8,300 bbl. daily and still increasing rapidly.

Primarily responsible for this huge jump is rank wildcat acreage leased by Thompson in the late forties and early fifties while serving as chief engineer and manager of exploration, land, and geology.

A good chunk of this acreage now lies atop prolific Aneth field—the first really big field in the Paradox basin. Still more sits in the middle of more recently discovered production in Totah and Cha Cha fields in the San Juan basin.

Since 1954, Aztec's net income has increased steadily from about $500,000—nearly all from gas sales—to nearly $5,500,000 annually now. Its assets have risen from only about $8,000,000 to more than $30,000,000. And its gross sales from about $1,700,000 to a peak this year of more than $10,000,000.

Significantly, the company has boosted its acreage holdings heavily, too. In 1954, it held only about 70,000 net acres of leases. Now the total is more than 630,000 net acres.

Still wildcatting . . . Thompson's aggressive policies have made Aztec a thriving oil company. But he hasn't abandoned them just because the firm now has a healthy production cushion.

Look at the company's undeveloped acreage today, and you discover that a sizeable portion is in remote areas.

For instance, Aztec now has 17,400 acres in northwestern Arizona, hundreds of miles from production. And it has filed there on federal land for 15,000 more.

In Alaska, it holds roughly 240,000 acres scattered over the Bristol Bay and Cook Inlet areas and in the Copper and Bethel basins.

It just finished picking up a large lease block on the Chadron Arch in Nebraska more than 50 miles from nearest production.

And Aztec is wildcatting actively—sometimes on its own, sometimes with others—in the Uinta, Powder River, Wind River, Big Horn, Williston, and Piceance basins in the Rockies.

Versatile experience . . . Though Thompson operates as if he'd spent his entire life in the oil exploration and producing business, he's not really an old-timer at it.

His industry career started with Southern Union Gas Co. in May 1930 as a meter reader.

He worked his way up to district transmission superintendent with the company in the mid-thirties. It wasn't until 1938 that he really plunged into the producing end when he was transferred to Dallas as an engineer.

In Dallas, Thompson—who had missed a formal education—started attending night school at Dallas College and stuck with it for 5 years. In 1939 he passed exams at the University of Texas qualifying him as a registered petroleum engineer.

In 1945 he was named chief engineer and at the same time assumed the duties of manager of the land and geological departments. In 1953 he was elected a vice president of Aztec, then a wholly-owned subsidiary of Southern Union.

He was named executive vice president of the company and a member of the board when Aztec was spun off from its parent to become an independent firm.

And, inevitably, earlier this year he was named president. One thing is certain, during Thompson's tenure his employes aren't apt to find their work dull.

●

Peter Lucas, geologist with Shell Oil Co., has been transferred to Pittsburgh from Coral Gables, Fla.

T. S. Farmer and **Dr. R. H. Perry** have been promoted to section heads in Humble's research and development division, Baytown, Tex. Farmer will head the engineering and operations section. Perry will head the petrochemicals exploratory-research section.

▶▶▶ Personals

Morgan J. Davis has been named chairman of Humble, a new position for the company since its reorganization in January 1960. **Carl E. Reistle, Jr.,** executive vice president, will succeed Davis as president. Davis will continue as chief

DAVIS

REISTLE

executive of the company. Davis joined Humble in 1925. He was chief geologist and exploration manager for the company before becoming a director in 1948 and vice president in 1951. He served as executive vice president and president of the old Humble before its reorganization in 1960. He has been president of the expanded company since that time. Reistle was also with the old Humble for many years, serving as chief petroleum engineer, manager of production, a director, vice president, and executive vice president. He became executive vice president when the new company was set up.

Barry D. Nolan, petroleum-products division manager at Humble's Billings, Mont., refinery, has been given a 1-year loan assignment as fuel-products coordinator in Houston.

Dr. M. R. Barusch has been appointed senior research associate in chemistry in the petroleum-products division of California Research Corp.'s Richmond, Calif., laboratory.

Loren F. Kahle, Jr., petroleum engineer with Creole Petroleum Corp. in Tia Juana, Venezuela, has been transferred to New York where he will be economic analyst in the economic coordination department of Esso Standard Eastern. This company was recently organized to take over the Standard Oil Co. (N. J.) properties which have been a part of Standard-Vacuum Oil Co.

H. E. Repp, geologist with Humble in Fort Smith, Ark., has been transferred to Tulsa as central area representative.

W. R. Sittig, Shell Oil Co. reservoir engineer in Abilene, Tex., has been transferred to Midland, Tex., in the same capacity.

J. V. Threadgill, superintendent for Stekoll Petroleum Co., has been transferred to Borger, Tex., from Snyder, Tex.

Gordon Pope, geologist in Humble's stratigraphic section, Billings, Mont., has been transferred to Denver in the same capacity.

Robert L. Mann has been promoted to research engineer in Continental Oil Co.'s research and development department, Ponca City, Okla.

Jack W. Anderson, resident engineer in Phillipsburg, Kans., for Cooperative Refinery Association, has been promoted to administrative engineer and transferred to Kansas City.

Thomas M. Dailey, Jr., manager of organization and planning in Tidewater Oil Co.'s home office, Los Angeles, has been named manager of the new home office planning and development department. The department will coordinate research and development efforts.

Gilbert H. LaPiere, manager of the oil and gas department of W. E. Hutton & Co., New York investment firm, has been elected vice president and manager of the petroleum department of Union Bank, Los Angeles. He had been with Chase Manhattan Bank and Cities Service Petroleum Co. before joining Hutton & Co.

Donald R. Leamy, assistant superintendent of Olin Mathieson Chemical Corp.'s ethylene plant in Brandenburg, Ky., has joined Sun-Olin Chemical Co. as supervisor of the ethylene plant at the company's Claymont, Del., petrochemical complex. **Ernest Artz** has been named supervisor of the ethylene - oxide plant at Claymont, and **Bruce G. Hawthorn** has been named supervisor of the urea plant.

Bert B. Miller, assistant to the president of Ohio Oil Co., has been named Ohio's representative in Madrid, Spain. Ohio has an interest in Cia. Iberica Refinadora de Petroleos, S.A., which will build a refinery on the northern coast of Spain. Miller is a former superintendent of Ohio's Lovell, Wyo., and Robinson, Ill., refineries.

William C. Presley, geophysicist for Humble in Miles City, Mont., has been transferred to Denver in the same capacity.

M. Howard Benton, resident engineer for Gulf Interstate Co. in Pampa, Tex., has joined Northern Natural Gas Co. in Omaha, Neb., as project engineer.

Daniel C. Gillespie, director of data processing for Columbia Gas System in Columbus, Ohio, has received the 1961 Systems and Procedures Association "systems man of the year" award. The award will be presented at the association's meeting next month in Cleveland.

Willard G. Wiegel, who recently retired as vice president of Lone Star Gas Co., has joined Byrd Enterprises, Dallas. He has been named executive vice president of Dallas Trust Co., vice president of Sabine Supply Co., and will be executive assistant to **D. H. Byrd** in management of Byrd Enterprises, which include oil and gas operations and other interests.

William G. Capps, area superintendent in El Paso Natural Gas Co.'s southern division, has been named Navajo pipeline district superintendent. **Walter C. Turner,** area superintendent in the southern division, has been named Lincoln pipeline district superintendent in the northwest division, Salt Lake City. **Glen L. Pool,** assistant division engineer in the Permian division, Jal, N. M., has been named division engineer. **Earl L. Hathaway, Jr.,** and **Robert H. Pyeatt,** field foremen in the San Juan division, Farmington, N. M., have been named

district superintendents. **Wayne B. Wilson,** plant foreman in the San Juan division, has been named station superintendent in the Aneth, Utah, plant. **William E. Ervin,** Tucson, Ariz., district foreman in the southern division, has been promoted to Topock, Ariz., district superintendent.

A. R. Field, assistant superintendent of Cherokee Pipe Line Co. in Wood River, Ill., has been promoted to superintendent of Continental Pipe Line Co.'s New Mexico district. He will headquarter in Artesia, N. M.

Ralph K. Hill, supervisory petroleum engineer with Humble in Houston, has been transferred to New Orleans. **Odell M. Morrison,** New Orleans, has been transferred to Humble's Los Angeles office as industrial engineer.

R. Jack Hawes, supervisor of technology at Tidewater Oil Co.'s Delaware City, Del., refinery, has been promoted to superintendent of technology. He succeeds **Dr. Arthur W. Lewis,** recently assigned to the Los Angeles home office. Hawes has been with Tidewater since 1939. Several area shift leaders have also been appointed at the Delaware refinery. The leaders and their areas are: **Everett M. Davis,** coking area; **Samuel B. Fox,** desulfurizing and hydrogen area; and **Frank L. Studier,** alkylation and polymerization. **Robert L. Vawter, Raymond C. Harris, Jr.,** and **Ralph M. Thompson** have been named shift leaders in the petrochemical area. **George B. Sparks** has been named acting shift leader, petrochemical area.

HAWES

Dr. K. K. McMillin has been promoted to senior staff engineer in the central-technical division of Humble's Baytown, Tex., refinery.

R. L. Sedway, production engineer for Union Texas Natural Gas Corp. in Midland, Tex., has been transferred to Oklahoma City as reservoir engineer.

Robert H. Wurth, senior geologist with Sinclair Oil & Gas Co., has been transferred to Houston from New Orleans.

Frank J. Lugar, Jr., district manager for Humble in Charleston, W. Va., has been named district manager in Norfolk, Va.

William O. Batson, district production superintendent for Sinclair Oil & Gas Co. in Ardmore, Okla., has retired after 44 years with the company.

Robert A. Northcutt, geologist for Pan American Petroleum Corp., has been transferred to Jackson, Miss., from Shreveport, La.

C. R. McMillin, manager of the operations division for Standard of California, Western Operations, Inc., is on special assignment for an indefinite time working with details of California Standard's acquisition of Standard Oil Co. (Ky.). **E. C. Waterman** will handle McMillin's duties during his absence.

E. H. Wenberg, photogeologist with Mene Grande Oil Co. in Caracas, has been transferred to Houston as photogeologist in technical services for Gulf Oil Corp., the parent company.

Sidney P. Thomes, director of engineering for Mobay Chemical Co., has been named construction superintendent for Monsanto Chemical Co.'s Chocolate Bayou project, near Alvin, Tex. **Robert B. West,** senior engineer with Monsanto's Lion Oil Co. division in El Dorado, Ark., has been named plant electrical engineer for the Chocolate Bayou project.

Ernest R. Fleck, Jansonius, Fleck & Associates, Bismarck, N. D., has been elected president of North Dakota Oil and Gas Association. Vice presidents include **Bruce P. Alfson,** Williston independent; **Willard A. Burton,** California Oil Co., Bismarck; **C. A. Dawson,** Skelly Oil Co., Bismarck; and **D. F. McMahon,** Bismarck independent. **William S. Murray,** Cox, Pearce & Engebretson, Bismarck, has been named secretary with **E. D. Saltzman,** First National Bank, Bismarck, as treasurer.

▶▶▶ Personals

George R. Bixler, formerly with BBM Drilling Co., Houston, has joined Vaughn Petroleum Co. in Dallas as manager of lands. Bixler took office as president of American Association of Petroleum Landmen in June.

Harry E. Hohmann, geologist with Gulf Oil Corp. in Charleston, W. Va., has been transferred to Oneonta, N. Y., in the same capacity.

R. L. Lindauer, Jr., reservoir engineer with Humble, has been transferred to Dallas from Tyler, Tex.

C. E. Corriher, geologist for Humble in New Orleans, has been transferred to Grande Isle, La.

Charles Reid Gaylord has resigned as senior vice president and a director of Signal Oil & Gas Co. in order to devote more time to management of personal affairs.

H. J. Kingry, Jr., geophysicist with Sinclair Oil & Gas Co., has been transferred to Lafayette, La., from New Orleans.

F. P. Barrow, head of the mechanical-engineering department at Humble's Baton Rouge refinery, has been named head of a new planning department in the mechanical division. **J. E. Eger,** assistant head of petroleum technical service at the refinery, will succeed Barrow in mechanical engineering. **F. J. Geiser,** senior technologist in petroleum technical-service, will succeed Eger. **J. E. Walker,** head of the long-range fuel products economics group, process engineering, at Baton Rouge, has been named assistant head of process engineering. He succeeds **E. W. Nommensen,** who has been transferred to the Houston headquarters manufacturing department. **P. C. Lindsey,** technologist in process engineering, will succeed Walker. **J. T. McMillin,** process engineering, has been named head of the cracking group in petroleum

Personals

technical-service. He succeeds **E. C. Foley,** who also has moved to Houston. **R. E. Lee,** assistant head of the butyl department, has been named assistant head of the light ends department. He succeeds **J. W. Rector,** who has been given a loan assignment with Svenska Esso AB, in Stenungsund, Sweden. **J. B. Arbour,** head of the oxo-cracking department at Baton Rouge, has been named head of an expanded alcohol department there. **J. G. Allen** will be assistant head. The new department combines the former alcohol and oxo-cracking departments. **A. F. Roach,** head of the old alcohol department, has been transferred to New York with Esso International.

W. Lyle Dockery, geologist with Pure Oil Co. in Denver, has joined Forest Oil Corp. in Denver as geologist.

Clifford L. Hart, engineer in the Cleveland office of Standard Oil Co. (Ohio), has been transferred to the Lima, Ohio, refinery as engineer in the process-engineering department.

R. K. Johnson, geologist with Mobil Oil Co. in Shreveport, La., has been transferred to Corpus Christi, Tex., in the same capacity.

F. T. Connolly, manager of the geological department in Shell Development Co.'s Houston exploration and production research division, has been named chief geologist, a new position, in the Houston area exploration department. **B. J. Ferris,** senior geologist, will succeed Connolly.

J. D. Wyatt, drilling superintendent for Edman Drilling Co., has been promoted to vice president and general manager. **J. S. Ashworth** will succeed Wyatt.

Claude Roberts, Jr., petroleum engineer for Ohio Oil Co. in Shreveport, La., has been named plant superintendent in the Sidney, Neb., district.

O. C. Kerfoot, senior research scientist for Continental Oil Co., has been promoted to research group leader in the petrochemical research division, Ponca City, Okla.

William F. Christie, director of market research for Amoco Chemicals Corp., has been named eastern representative, market research and development. He will headquarter in New York.

Harris Houston, formerly with Crown Petroleum Corp., has joined Cardinal Petroleum Corp. as West Texas crude-oil representative. He will headquarter in the company's new Midland, Tex., office.

B. S. Parrott, geologist for Shell Oil Co. in Houston, has been transferred to the New Orleans area. **P. D. Baldauf,** paleontologist in Houston, has been transferred to Corpus Christi, Tex., as a geologist.

W. L. Broadhurst, High Plains Water District, has been elected president of Lubbock, Tex., Geological Society. He succeeds **B. F. Baldwin,** Pan American Petroleum Corp. Other new officers are **H. D. Teel,** Pan American Petroleum, vice president; and **G. E. Tarbox,** Pan American, secretary-treasurer.

Jack D. Burgess, geologist-paleontologist for Humble in Billings, Mont., has been transferred to Denver in the same capacity.

R. N. Myers, manager of Shell Oil Co.'s marine production division in New Orleans, has retired after 33 years with the company.

New shift supervisors at El Paso Natural Gas Products Co.'s Odessa, Tex., ethylene plant are **Kenneth W. Clower, O. S. Johnson,** and **Jack E. Donaho.**

Graham W. Garton, assistant general manager of marketing for British American Oil Co., has been named to the new post of government representative in Ottawa.

Walter L. Hahn, district reservoir engineer for Texaco in Wichita Falls, Tex., has joined **T. F. Hodge,** Fort Worth independent operator, as production manager.

H. W. Magee has been named petrochemicals representative in Milan, Italy, for Gulf Oil Corp. and its subsidiary, Transocean Chemical Co. Magee had been in London as special representative, European activities, for Gulf's petrochemicals department.

W. E. Hall, now on temporary assignment in Australia, has been named regional research geologist in Atlantic Refining Co.'s western region. **J. R. Cotton,** district geologist in Roswell, N. M., has been appointed western division administrative assistant. In Dallas, **James C. Osborne** and **Floyd C. Strom** have been named senior construction engineers.

Deaths

Charles Cassius Gates, 83, president of Gates Rubber Co., Denver, died August 29. Gates founded Gates Rubber Co., now the country's sixth largest rubber manufacturer, in 1911. He had been president of the firm since that time.

Recent death of **Sidney Tanner,** 40, engineer in Tulsa with Seismograph Service Co., was confirmed last week when Tanner's body was found near Nepeague Beach at East Hampton, N. Y. Tanner was killed in the crash of a light plane August 15.

Ezra B. Bobo, 40, production supervisor at Union Carbide Chemical Co.'s Texas City plant, died August 18 of an apparent heart attack. Bobo had been with Union Carbide since 1941. He was named a production supervisor in 1959.

Tom J. Good, 83, Texas rancher and oil man, died August 24 at his ranch near Big Spring, Tex.

Chase S. Montjar, 68, former construction superintendent for the old General Petroleum Corp. and for Fluor Corp., died August 23 in a Santa Monica, Calif., hospital.

Roger Plummer, 60, Bixby, Okla., independent operator, died August 29 in a Tulsa hospital after a month's illness. Plummer's many business interests included oil and gas production and a number of service stations in the Bixby area.

Edward D. Ruse, 70, production manager for National Associated Petroleum Co., died recently in Sterling, Colo., after suffering a heart attack.

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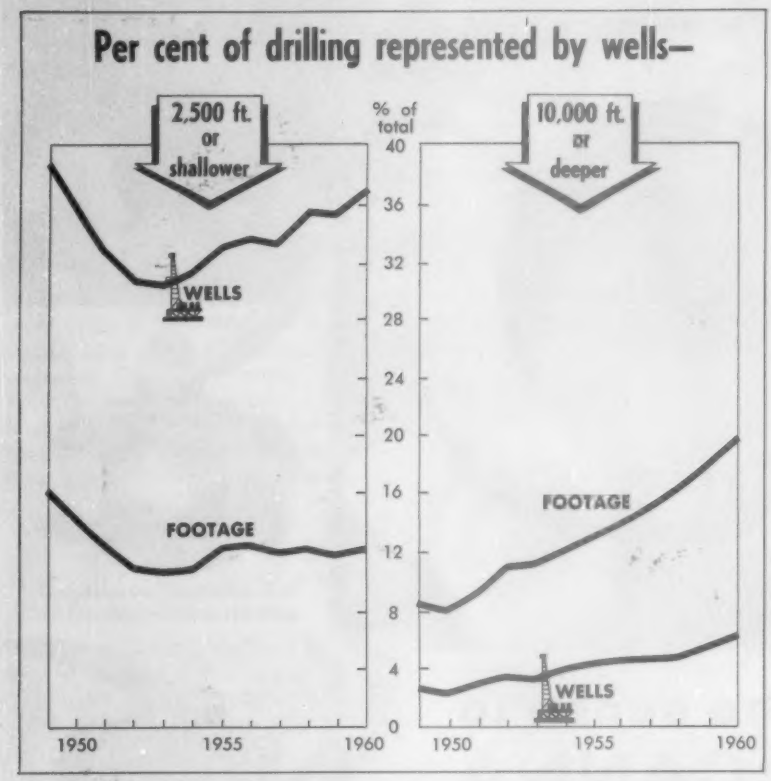

Deep wells get bigger slice of drilling budgets

BY JOHN C. CASPER

DRILLING is growing at both ends and shrinking in the middle. Very shallow and very deep drilling have increased, but middle-range completions have been off in recent years.

Operators actually drilled more deep wells in 1960 than they did back in the record year 1956. Also, many producers have rushed to get in on some of the shallow-drilling plays in Kentucky, Oklahoma, and Michigan. The end result has been more deep wells and more shallow wells at a time when total drilling was declining.

Relative changes for both shallow and deep drilling are shown on the charts. Plotted points represent percentages of total completions each year.

The top line on the left chart represents well completions classed as 2,500 ft. or shallower. This group's portion of total completions climbed from a low of just under 31% in 1953 to 37% in 1960.

The all-time record for total completions in this country was set in 1956. Drilling reports showed that 34% of all wells that year were shallower than 2,500 ft. Within this classification, very shallow wells, those under 1,250 ft., numbered 5,585 and accounted for 9.6% of total drilling for the year. In 1960, drilling in this very shallow group had increased to 7,326 wells, representing 15.7% of total completions.

Deep drilling also showed a gain, both in number of wells and per cent of the total. Operators completed 815 wells in 1956 that were deeper than 12,500 ft., including 142 wells that were deeper than 15,000 ft.

Completions below 15,000 ft. increased to 222 wells in 1960 for a gain of 80 wells over the 1956 total. Deep drilling increased 80 holes in a period when total drilling dropped almost 10,000 wells.

According to the Joint Cost Study, these wells below 15,000 ft. cost about 100 times as much as wells under 1,250 ft. The gain of 80 deep wells represented investment equivalent to cost of about 8,000 of the shallow wells. Since the shallow-well gain was only 1,741, it is evident that operators boosted budgets for deep drilling more than for shallow wells.

However, drilling in shallow areas has a definite influence on depth of the average well. Back in 1958, average well depth decreased 83 ft. because of shallow drilling in Green County, Kentucky, and Kiowa County, Oklahoma. Excluding these counties, average depth would have increased 1 ft. per well.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,055,820	DOWN	8,780	UP	109,593
Crude stocks	253,665,000	DOWN	2,366,000	UP	15,357,000
Completions	933	NO CHANGE		DOWN	22
Refinery runs	8,558,000	UP	219,000	UP	386,000
Gasoline stocks	191,256,000	DOWN	1,542,000	UP	576,000
Kerosine stocks	33,740,000	UP	823,000	UP	1,413,000
Distillate stocks	147,970,000	UP	6,335,000	DOWN	996,000
Residual stocks	47,561,000	DOWN	1,382,000	UP	2,252,000
Four-product stocks	420,527,000	UP	4,234,000	UP	3,245,000
Total imports	1,388,800	DOWN	175,300	DOWN	80,100

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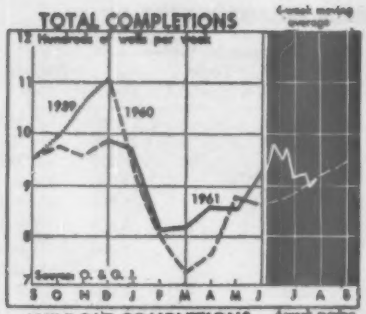
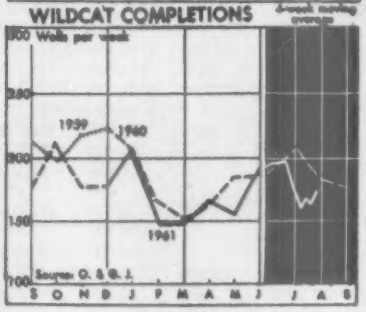
DRILLING





	8-28-61	8-21-61	8-29-60
Alabama	6	6	5
Alaska	11	11	7
Arkansas	11	13	11
Arizona	0	0	1
California	76	77	86
Land	71	72	85
Offshore	5	5	1
Colorado	26	29	47
Florida	2	1	2
Land	0	0	2
Offshore	2	1	0
Georgia	1	1	0
Illinois	46	37	41
Indiana	9	6	8
Iowa	1	1	0
Kansas	91	91	102
Kentucky	15	4	3
Louisiana	279	280	266
North	46	47	27
S. Inland waters	101	103	107
S. Land	77	77	74
Offshore	55	53	58
Maryland	0	0	1
Michigan	19	27	32
Mississippi	68	71	50
Missouri	1	1	1
Montana	27	25	25
Nebraska	20	29	16
New Mexico	121	127	112

	8-28-61	8-21-61	8-29-60
New York	1	1	1
North Dakota	14	16	12
Ohio	7	9	6
Oklahoma	223	215	163
Oregon	0	0	1
Pennsylvania	9	9	10
South Dakota	0	1	2
Tennessee	1	0	2
Texas	637	662	562
S. Inland waters	7	9	2
S. Land	184	173	178
Offshore	1	2	1
North	55	67	45
Panhandle	62	65	44
East	67	65	42
West Central	147	156	144
West	114	125	106
Utah	38	34	28
Washington	1	1	1
West Virginia	11	12	5
Wyoming	66	65	59
Total U. S.	1,838	1,862	1,668
Cum. avg. to date	1,700	1,696	1,731
Western Canada	151	150	159
Eastern Canada	2	2	1
Grand Total	1,991	2,014	1,828

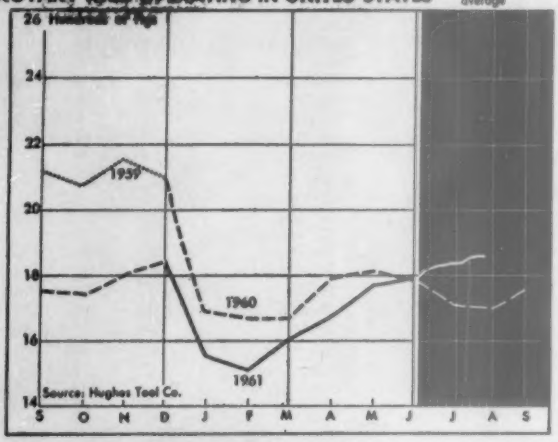
Hughes Tool Co. report.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 26, 1961

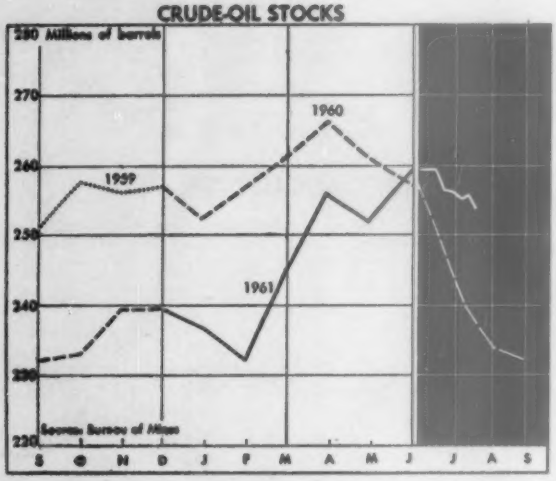
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Alabama	0	0	0	0	0	0	0	31	32	0	0	0	0	0	7	2
Alaska	2	1	0	0	1	0	21,580	30	.....	1	0	0	0	1	6	.....
Appalachian	20	3	0	10	7	0	45,431	1,383	1,166	0	0	0	0	0	52	39
Arizona	0	0	0	0	0	0	0	16	25	0	0	0	0	0	10	18
Arkansas	9	4	0	0	5	0	37,230	326	394	4	0	0	0	4	69	110
California	41	28	0	0	5	8	165,482	1,094	1,080	5	0	0	0	5	168	205
Colorado	11	3	0	2	6	0	48,119	390	410	4	1	0	0	3	184	206
Illinois	104	25	0	0	10	69	257,651	1,305	1,432	7	2	0	0	5	283	303
Indiana	15	4	0	0	10	1	24,853	462	653	3	1	0	0	2	122	243
Kansas	81	35	0	6	33	7	300,477	3,353	2,205	13	0	0	1	12	623	678
Kentucky	45	15	0	2	27	1	48,664	1,286	1,227	1	0	0	0	1	90	118
Louisiana	87	38	4	15	30	0	534,759	2,479	2,285	10	1	0	0	9	390	360
North	46	23	1	13	9	0	130,703	978	848	4	0	0	0	4	167	174
South	31	8	3	2	18	0	307,520	1,141	1,107	6	1	0	0	5	186	163
Offshore	10	7	0	0	3	0	96,536	360	330	0	0	0	0	0	37	23
Michigan	11	4	0	0	7	0	41,742	489	576	5	0	0	0	5	179	152
Mississippi	8	3	0	0	5	0	69,954	355	452	6	1	0	0	5	123	172
Montana	4	3	0	0	1	0	34,213	241	196	1	0	0	0	1	112	93
Nebraska	18	5	0	0	13	0	86,691	664	581	11	1	0	0	10	323	236
New Mexico	23	7	0	3	13	0	135,526	1,150	1,215	11	2	0	0	9	195	188
West	7	1	0	3	3	0	43,435	507	402	4	1	0	0	3	63	45
East	16	6	0	0	10	0	92,091	643	813	7	1	0	0	6	132	143
North Dakota	6	4	0	0	2	0	38,451	173	196	0	0	0	0	0	43	52
Ohio	23	12	0	0	11	0	49,912	672	663	2	0	0	0	2	32	35
Oklahoma	125	52	3	16	48	6	551,772	3,836	3,010	17	2	0	0	15	375	493
Texas	279	147	5	15	104	8	1,292,436	9,464	10,359	71	9	0	1	61	1,984	2,137
District 1	24	8	0	0	16	0	71,110	582	713	13	1	0	0	12	235	267
District 2	13	5	1	1	6	0	81,114	516	497	5	0	0	1	4	143	123
District 3	15	6	1	1	7	0	103,228	754	800	2	0	0	0	2	147	149
District 4	18	7	1	1	9	0	96,139	803	716	6	1	0	0	5	186	202
East	17	6	1	0	10	0	117,195	800	835	7	0	0	0	7	203	172
District 7-B	30	11	1	2	16	0	94,976	1,190	1,510	10	1	0	0	9	329	438
West	81	57	0	5	15	4	479,110	2,347	2,716	16	4	0	0	12	499	419
District 9	60	38	0	0	18	4	137,579	1,700	1,890	6	0	0	0	6	175	325
District 10	21	9	0	5	7	0	111,985	772	682	6	2	0	0	4	67	42
Utah	3	2	0	0	1	0	22,319	159	167	1	0	0	0	1	71	56
Wyoming	17	6	0	3	8	0	91,407	608	684	8	1	0	1	6	228	276
Misc. (S. D.)	1	0	0	0	1	0	6,128	139	120	1	0	0	0	1	126	101
Total U. S.	933	401	12	72	348	100	3,904,797	30,105	29,128	182	21	0	3	158	5,795	6,273
Total prev. week	933	420	16	103	341	53	3,787,710	.....	.....	175	18	2	11	144	.....	.....
Cum. 1961	30,105	13,467	620	2,946	10,822	2,250	121,373,007	.....	.....	5,795	514	62	260	4,959	.....	.....
Cum. 1960	29,128	13,323	869	2,378	11,209	1,349	123,952,594	.....	.....	6,273	554	68	202	5,449	.....	.....
Western Canada	55	47	0	5	2	1	329,074	1,447	1,518	10	3	0	0	7	.....	407

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	8-19-61	8-12-61	8-20-60
Pennsylvania	2,451	2,471	2,348
Other Appalachian	1,664	1,654	1,690
Illinois, Indiana, Michigan	10,508	10,124	9,297
Nebraska and North Dakota	3,663	3,764	2,919
Kansas	9,204	9,576	8,549
Oklahoma	16,874	17,050	16,254
Arkansas	1,755	1,853	1,714
Louisiana	19,749	21,240	17,636
North	3,495	3,317	3,063
South	16,254	17,923	14,573
Mississippi, Alabama, Florida	3,407	1,829	2,320
New Mexico	8,143	7,926	8,727
Texas	108,225	107,778	100,186
East Texas	8,544	8,356	8,056
West Texas	48,039	48,603	47,495
Texas Gulf	19,123	18,745	16,992
Other Texas	32,519	33,074	27,643
Wyoming	16,762	17,285	15,864
Other Rocky Mountain	9,843	9,859	9,364
California	24,153	24,281	26,625
Foreign	†17,264	18,341	14,815
Total	**253,665**	256,031	238,308

*Bureau of Mines. †Includes 5,125,000 bbl. in California.

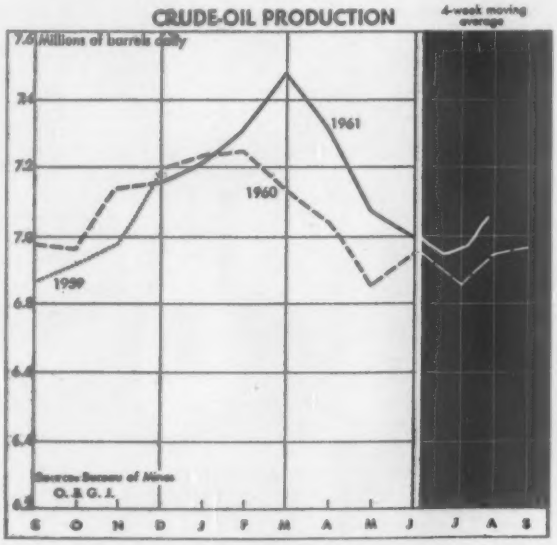
DAILY AVERAGE PRODUCTION FOR WEEK

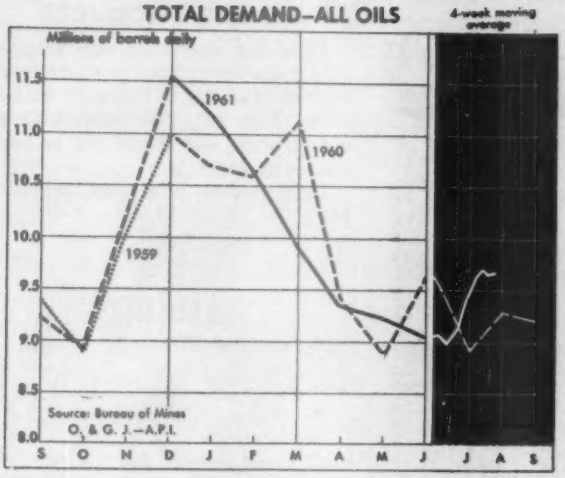
	August 26, 1961 Crude oil	Lease condensate	Total	Aug. 19 total
Alabama	17,000	.....	17,000	19,800
Alaska	20,400	.....	20,400	19,500
Arkansas	74,950	100	75,050	78,300
California	813,700	.....	813,700	813,600
Colorado	126,500	.....	126,500	124,600
Eastern	39,600	.....	39,600	39,800
Florida	1,000	.....	1,000	1,000
Illinois	212,700	.....	212,700	213,600
Indiana	30,200	.....	30,200	29,800
Kansas	†303,020	.....	†303,020	†311,400
Kentucky	51,300	.....	51,300	50,500
Louisiana	996,600	137,900	1,134,500	1,134,650
North	105,600	5,400	111,000	111,150
South	891,000	132,500	1,023,500	1,023,500
Michigan	53,500	.....	53,500	53,700
Mississippi	146,600	3,650	150,250	150,250
Montana	86,400	.....	86,400	85,900
Nebraska	61,800	.....	61,800	58,400
Nevada	400	.....	400	450
New Mexico	315,000	7,500	322,500	322,500
North Dakota	56,800	.....	56,800	55,400
Oklahoma	†500,900	.....	†500,900	†508,500
Texas	2,418,000	89,650	2,507,650	2,507,650
Dist. 1	42,000	2,600	44,600	44,600
Dist. 2	100,000	7,900	107,900	107,900
Dist. 3	312,000	38,000	350,000	350,000
Dist. 4	176,000	12,500	188,500	188,500
Dist. 5	27,000	600	27,600	27,600
Dist. 6	113,000	8,000	121,000	121,000
East Texas Field	128,000	.....	128,000	128,000
Dist. 7-B	125,000	400	125,400	125,400
Dist. 7-C	103,000	3,450	106,450	106,450
Dist. 8	994,000	12,000	1,006,000	1,006,000
Dist. 9	193,000	2,500	195,500	195,500
Dist. 10	105,000	1,700	106,700	106,700
Utah	87,300	.....	87,300	85,400
Wyoming	402,700	.....	402,700	399,300
Others	‡650	.....	‡650	‡600
Total U. S.	6,817,020	238,800	**7,055,820**	7,064,600
Change from prev. week, down			**8,780**	
Canada	†672,000	.....	†672,000	†654,000

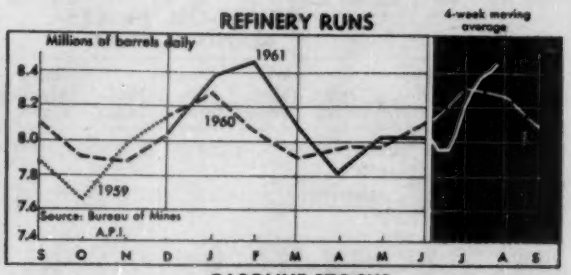
Total U. S. Prod.-Jan. 1-Aug. 26 ..... 1,710,264,100 bbl.
Same period last year (crude plus cond.) ..... *1,679,790,300 bbl.

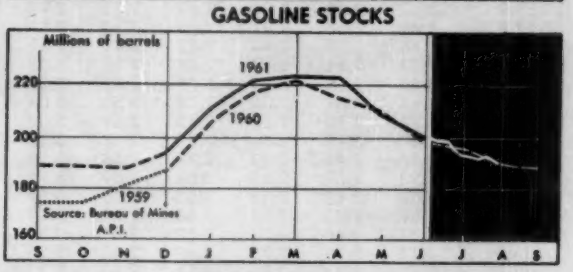
*Includes 54,266,100 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

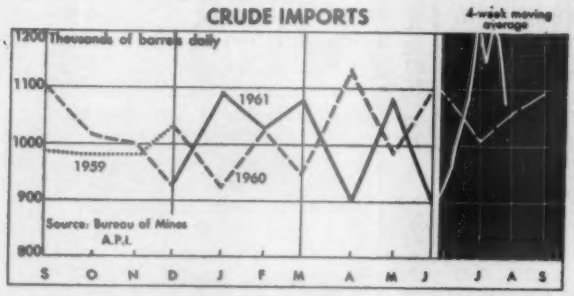
CRUDE-OIL PRODUCTION

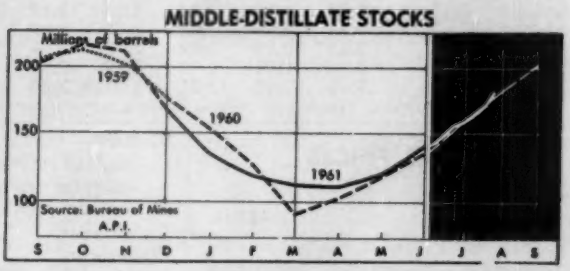


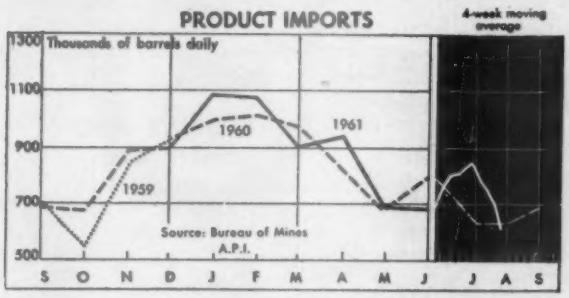


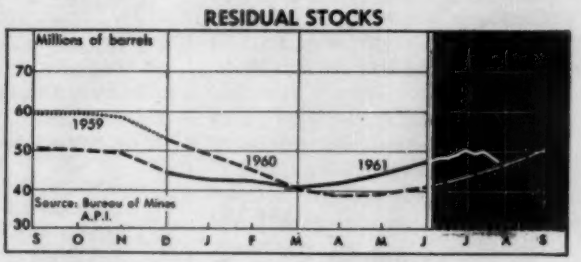












API REFINERY REPORT—AUGUST 25, 1961
(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1960 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,194	564.3	40.3	349.7	139.7	47,367	12,482	50,971	12,204	1,128	490.0	33.8	299.7	140.4
Appalachian:														
District 1	102	43.4	3.6	24.7	5.6	5,342	614	3,175	385	94	41.2	3.1	22.5	8.0
District 2	113	58.3	4.3	22.1	8.7	2,622	421	1,523	319	109	53.5	3.8	19.7	10.5
Ind., Ill., Ky.	1,601	831.6	80.4	367.0	130.7	32,390	6,982	26,568	5,296	1,511	693.1	64.8	262.0	130.9
Minn., Wis., Dak. .	131	61.4	7.4	30.6	17.1	6,650	1,567	7,691	698	132	38.5	2.0	17.7	15.2
Okla., Kans., Mo. .	766	422.3	9.6	180.0	17.0	17,610	1,673	12,328	961	752	384.8	13.7	150.5	16.8
Inland Texas	312	210.9	13.1	44.1	22.1	7,266	615	1,604	2,743	308	211.3	8.3	49.7	21.2
Texas Gulf Coast .	1,924	1,005.8	118.9	534.8	117.4	24,568	3,720	17,381	5,051	1,886	972.7	87.7	448.1	137.1
La. Gulf Coast ...	692	374.6	68.9	161.9	35.6	9,998	2,369	6,257	1,201	679	390.6	53.0	139.1	47.5
N. La. and Ark. ..	114	77.3	1.7	26.3	6.4	6,096	990	2,014	189	109	69.4	3.7	26.4	6.8
Rocky Mountain:														
New Mexico ...	26	14.1	0.4	4.4	3.7	624	47	237	68	26	12.5	0.4	4.2	2.1
Other Rocky Mt.	310	146.7	7.4	63.9	33.9	5,761	659	2,923	1,104	313	139.6	6.5	60.8	34.7
West Coast	1,273	588.0	29.7	189.3	244.8	24,962	1,601	15,298	17,342	1,203	563.4	39.1	204.9	285.3
Aug. 25, 1961..	8,558	4,398.7	385.7	1,998.9	782.7	191,256	33,740	147,970	47,561	8,250	4,060.6	319.9	1,705.3	856.5
Aug. 18, 1961..	8,339	4,289.4	369.0	2,030.3	806.0	§192,798	§32,917	141,635	48,943	.....	.....	.....	.....	.....
Aug. 26, 1960..	8,172	4,212.4	392.3	1,819.0	893.1	190,680	32,327	148,966	45,309	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines. §Rev.

CRUDE-OIL PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Julesburg	Wyo. (sour)
14.14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	$1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.91
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	(†)	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	.281	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33-9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague. †Two buyers announced increase.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	$4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Buckeye Grade	4.08
Illinois Basin	**3.00-3.05**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34.9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41.0°-41.9°, Umm said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.53
Redwater (Alta.)	2.42
Weyburn (light)	2.085
Midale C	1.71
Venezuela:	
Cumarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long ton)

(Latest reported spot fixtures)

★ Gulf-NY-clean (ATRS + 42.5%)	$4.06
★ Gulf-NY, dirty (ATRS + 30%)	3.71
★ Carib.-NY, clean (ATRS – 42.5%)	1.58
★ Carib.-NY, dirty (ATRS – 55%)	1.28
★ PG-Japan, dirty (USMC – 72.5%)	2.81

★ Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless other wise listed.

GASOLINE*

Mid-Continent (Group 3):	
★ Regular (91 octane)	10.50-11.00
★ Premium (99 octane)	13.25-13.75
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
★ Regular (90 octane)	10.50-11.00
★ Regular (92 octane)	10.75-11.25
★ Premium (98 octane)	11.75-12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.60
Premium (94 octane)	12.60
Premium (100 octane)	14.10
Caribbean area (cargoes):	
Regular (87 octane)	9.00
Premium (97 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-9.75
Diesel oil (58 d.i. and above)	9.00-9.25
Distillate No. 1	9.00-9.25
Distillate No. 2	8.25-8.50
Gulf Coast (cargoes):	
Kerosine 41-43	9.50
Distillate No. 2	8.50
New York Harbor (barges):	
Kerosine 42-43	11.20
Distillate No. 2	10.20
Diesel fuel, 48-52 d.i.	10.35
Caribbean area (cargoes):	
Distillate No. 2	8.10

RESIDUAL FUEL

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.65-1.75
Gulf Coast (cargoes):	
Bunker C fuel	2.20-2.30
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C fuel	2.00
California (rack):	
Bunker C fuel, Los Angeles	2.25

Oil's Smithsonian showcase shaping up

. . . but industry support needed. Individuals asked to pitch in with ideas, materials, and equipment to depict evolution in drilling, production, and reservoir engineering.

THE OIL INDUSTRY will be on permanent exhibit at the Smithsonian Institution in Washington, D. C., when a new building to house the Museum of History and Technology is completed early in 1962.

A special subcommittee of the API's Division of Production and three task forces have been formed to coordinate the work of finding, screening, and assembling oil-industry equipment and material of historical and educational value.

T. O. Allen, Jersey Production Research Co., Tulsa, chairman of the subcommittee, said that success of the project depends to a great extent on individuals in the oil business.

He asks that individuals furnish the subcommittee with information and leads on appropriate equipment and materials.

The exhibit is designed to accurately depict the development of the industry from its beginning more than a century ago to its present role in the nation's economy.

It will be housed in a special Hall of Petroleum in the new building now under construction.

Vice president of the subcommittee is L. E. Elkins, Pan American Petroleum Corp., Tulsa. Executive secretary is J. E. Eckel of Jersey Production Research, Tulsa, and alternate secretary is M. P. Huntington, Pan American, Tulsa.

The drilling task force is headed by L. E. Fitzjarrald, Phillips Petroleum Co., Bartlesville, Okla. Chairman of the production task force is F. H. Willibrand, Sohio Petroleum Co., Oklahoma City, and chairman of reservoir engineering is J. J. Reynolds, Continental Oil Co., Houston.

The chairman . . .

T. O. ALLEN, chairman of API's subcommittee on Smithsonian exhibits.

Types of Exhibits

Proposed drilling exhibits include ancient methods used; early cable-tool rigs; rotary rigs from the Spindletop era to the current folding-mast type; evolution of bits, drilling fluids, and cementing methods; and drill-stem testing and coring.

Production exhibits will include artificial lifts; surface pumping equipment; tank batteries; and casing-perforating, well-stimulation, and completion methods.

Reservoir-engineering exhibits will include models or illustrations concerning the habitat of oil and mechanisms of movement to wells; photos of early-day close spacing; aerial photos of controlled wide spacing; evolution of well tools; lab apparatus and methods; logging; and economics.

Several refinery models and a U. S. marketing map showing energy distribution will be among the exhibits.

The subcommittee expects to complete and install the exhibits prior to the opening of the new Smithsonian building, which is scheduled about March 1. Individual task forces will assemble as many exhibit suggestions as possible early this fall.

Allen has requested that all suggestions be sent to him or to the various task-force chairmen. No equipment or material should be shipped until it has been accepted by both the API subcommittee and the Smithsonian Institution.

. . . and his subcommittee and task force

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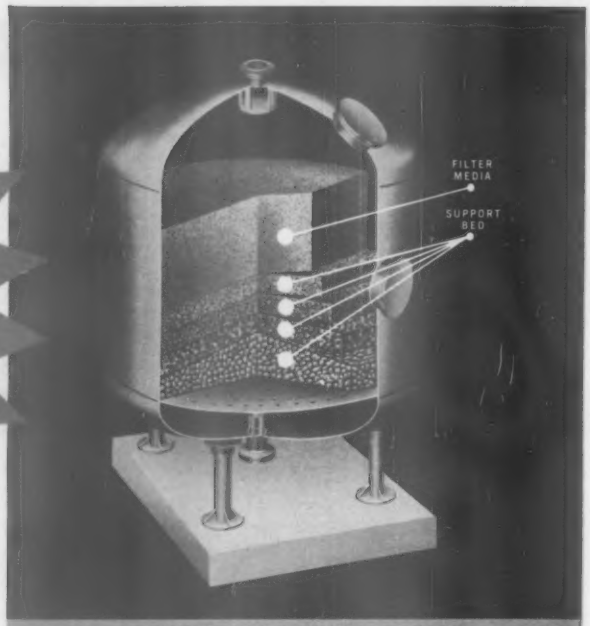
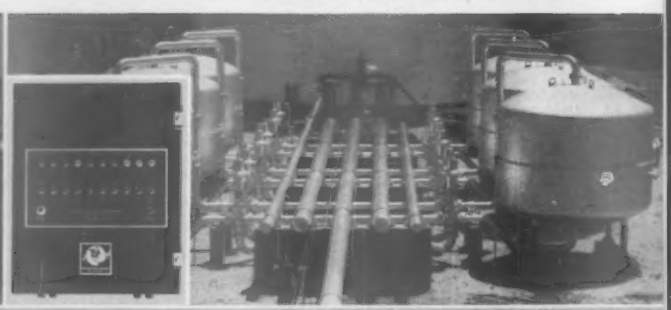


National's Multiple Orifice Bed Plate Design with Multiple Graded Bed

Filter manifolds, fabricated from National grooved couplings and fittings and valves, are rigid, leak-proof and afford a great degree of flexibility in assembly. Furnished with manually or automatically operated valves.



National's Automatic Backwash Filter Programmer is a rugged industrial-type electrical control system. Length of backwash may be changed and can be operated manually. Individual filters can be by-passed.

The quality of water can determine the success or failure of a water flood project. Your company has liability insurance to protect against hazards. Why not extend your coverage by buying insurance that your formation will not plug due to suspended solids. When you buy, buy the best — buy NATIONAL!

NATIONAL FILTERS ARE AVAILABLE:

. . . in a variety of sizes and working pressures to suit different capacities.

. . . in horizontal, vertical, pressure and gravity types.

. . . with complete prefabricated and packaged valve manifolds, including all controls for automatic operation.

. . . ready for use after a bare minimum of installation costs.

NATIONAL RAPID MECHANICAL FILTERS can serve you well. They are designed with all the factors in mind that command good filter performance.

It's a National®

NATIONAL TANK COMPANY

DRAWER 1710

TULSA, OKLAHOMA

AS PROCESSING EXPANDS WORLDWIDE

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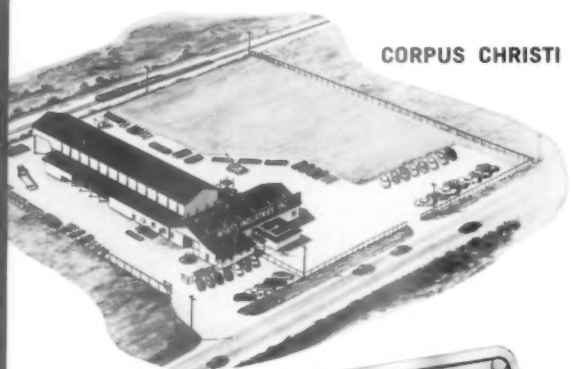
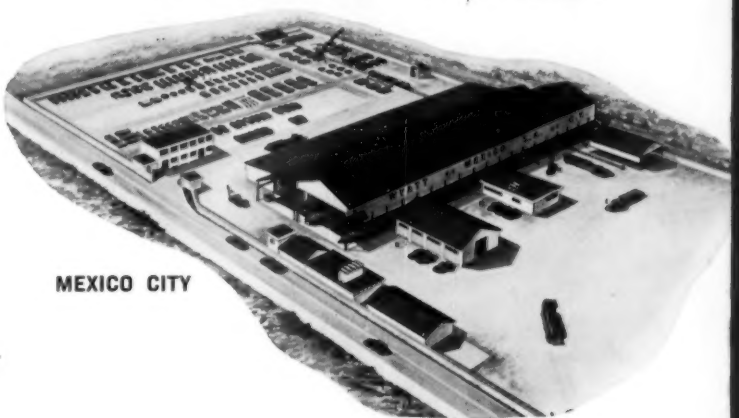


CORPUS CHRISTI

Wyatt's Facilities for Fabricating Steel and Alloy Plate KEEP PACE IN MATCHING STRIDES



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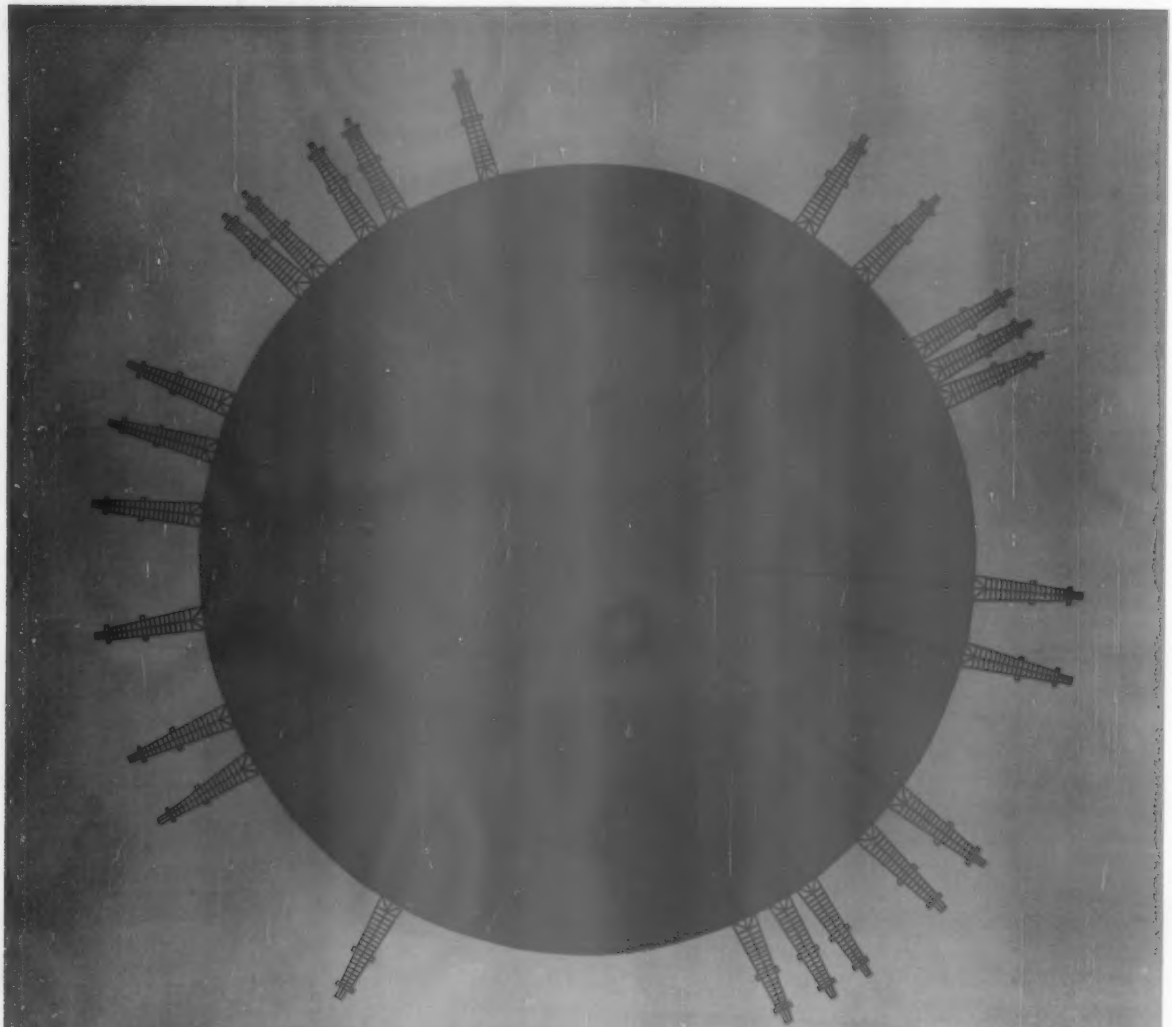
Paris (16E) France



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The footage drilled with Hughes bits is equivalent to more than 50 times through the earth. Here's unmatched experience that goes to work for you with every Hughes rock bit you run.

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